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Welcome Message from Chairman

On behalf Organizing Committee, it is my privilege to welcome you to the First International Conference on Industrial Electronics, Robotics and Informatics (ICIERI 2024). The ICIERI 2024 is organized by Faculty of Engineering Universitas Sebelas Maret and join collaboration with Binus University, Universitas Gadjah Mada, National Research and Innovation Agency Republic of Indonesia, TU Delft, National University of Singapore, University of Ulsan, Ho Chi Minh City University of Technology and Education, Bristol University and Numidia.

The theme of ICIERI 2024 is "**Embracing The Future Through Green Technology Innovation**", which held as hybrid conference (in-person and virtual) from November 5th 2023, with the physical conference conducted at The Alana Hotel and Convention Centre, Surakarta, Indonesia. This event will include participation of renowned keynote speakers, oral presentations, technical conferences related to the topic dealt with in the program.

The committee accepted 83 papers after reviewing 115 papers from various countries including, South Korea, Singapore, Malaysia, Thailand, India, Peru, Nigeria and Indonesia. Accepted papers will be presented in person or virtually and published in reputable proceeding series, SPIE Proceedings.

As the high numbers of papers presented from various contributors, I hope this triggers the collaboration among the researches who participated in this event. International engagement and cooperation are very important in solving the global problem that we are facing. This is in line with vision this conference.

I especially thank all of the keynote speakers, invited speakers, participants, sponsors and partners for their contribution and all committees for their great effort to organize this conference.

I wish you a successful and enlightening conference.

Joko Hariyono, Ph.D

Chairman, ICIERI 2024

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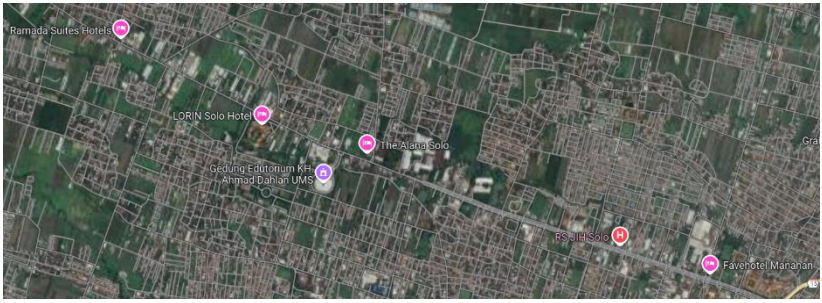
BY ASTON

The Alana Hotel & Convention Center - Solo is a premier destination for events and accommodations in the heart of Solo, Indonesia. This venue offers extensive facilities, including a grand ballroom and nine adaptable meeting rooms that can host up to 1,000 guests, ensuring a smooth event planning experience for all types of gatherings. The hotel's 247 elegantly designed rooms and suites provide a serene atmosphere with top-notch amenities for a relaxing stay, complemented by cozy beds for a restful night after a busy day.

Guests at The Alana can enjoy various leisure facilities, including a fitness center, both indoor and outdoor pools, and massage services, perfect for relaxation. Dining options are abundant, with special cuisines served exclusively to guests. Free WiFi in public areas keeps guests connected, while the attentive service makes The Alana Hotel & Convention Center a preferred choice for visitors in Solo, whether for business or leisure.

Maps

Map around The Hotel



Invited Speakers

Prof. Ford Lumban Gaol

Dr. Eng. Budi Prawara

Prof. Wahyudi Sutopo

Prof. Tong-Heng Lee

Prof. Hoang Van-Dung

Conference Program

First Day | Tuesday, November 5th 2024

Time (Surakarta GMT +7)	PROGRAM
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08.00 - 08.20	Opening Ceremony
08.20 - 08.40	Performance by Art Dance
08.40 - 09.00	Photo Session & Coffee Break
09.00 - 09.30	Keynote Speech: **Prof. Wahyudi Sutopo**
09.30 - 10.30	Invited Speech I: **Prof. Tong-Heng Lee** Invited Speech II: **Prof. Ford Lumban Gaol** Moderator **Dr. Eng. Teguh Muttaqie**
10.30 - 11.30	Invited Speech III: **Dr. Eng. Budi Prawara** Invited Speech IV: **Alexander Filoneko, Ph.D** Moderator **Joko Hariyono Ph.D**
11.30 - 12.30	Lunch Break
12.30 - 14.30	**Parallel Session I**
	Symposium I & II
14.30 - 14.50	Coffee Break
14.50 - 16.30	**Parallel Session I**
	Symposium III & IV
16.30 - 17.00	**AWARD ANNOUNCEMENT & CLOSING**

Second Day | Wednesday, November 6th 2024

Time (Surakarta GMT +7)	PROGRAM
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09.00 - 13.00	City Tour
13.00 - 13.30	**CLOSING & FAREWELL**

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Department of Informatics Engineering Pelita Bangsa University[1]
Email: aswan.sunge@pelitabangsa.ac.id [a], candranaya@pelitabangsa.ac.id [b], antika.kamalia@pelitabangsa.ac.id [c], nanang@pelitabangsa.ac.id [d], irfanafriantoro@pelitabangsa.ac.id [e], agussuwarno@pelitabangsa.ac.id [f]

Weather conditions or when the rainy season is uncertain makes washing clothes as a routine human activity difficult because the rain comes erratically, one of the problems is when it's time to dry the clothes and then after a while it rains, which results in drying the clothes taking a long time and making it lazy to put the clothes in. into the shade and this problem supports making the design of automatic drying equipment important. With the help of a microcontroller, it will read the input from the light and humidity sensors and then send instructions to the driving motor to control the drying device to automatically move to the shade or in the sun. This tool can be controlled manually with the help of an Android smartphone application so that we can control the clothesline without being influenced by sensors or our will if we want to pull the clothes into the shade. The sensor data is then stored if there is a request from the user and then displayed on the online site. The advantage of the design in this system is that it is real-time with an update time every minute and a web server is used to display the stored data for access.

Keyword: Clustering, Automatic Sunning Tool, Prediction, Rainfall, Drying Clothes

PAPER ID: 002

Review Articel Intelligent System in Tourism Macro Ergonomics Perspective

Trio Yonathan Teja Kusuma[1.a], Susy Susmartini[1.b], Bambang Suhardi[1.c], Lobes Hardiman[1.d]

Industrial Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: trio.yonathan@gmail.com [a], susy_susmartini2015@staff.uns.ac.id [b], bambangsuhardi@staff.uns.ac.id [c], lobesherdiman@staff.uns.ac.id [d]

Intelligent systems are increasingly used to support travel information search and decision making. From the literature in the field of tourism, this paper discusses the important gaps in the use of intelligent systems against human factors, which must be harmonized so that the design of intelligent systems is more optimal. The use of macro ergonomic aspects in the development and application of intelligent systems technology supports the creation of safe, ethical, and usable intelligent systems. This challenges simplistic views of travel information retrieval and decision-making processes and requires further research into potential impacts.

Keyword: intelligent system design, macro ergonomics, group decision making, technology user interaction, privacy.

PAPER ID: 003

Determination of Search Space – Search Space Preprocessing - for Particle Swarm Optimization Using Response Surface Methodology

Raymundus Lullus Lambang Govinda Hidayat[1], Budi Santoso[1], Wibawa Endra Juwana[1], Wibowo[2], Didik Djoko Susilo[2], Fitrian Imaduddin[2], Ubaidillah[2]

Student of Doctoral Program in Mechanical Engineering, Sebelas Maret University, Indonesia[1]
Staff of the Mechanical Engineering Department, Faculty of Engineering, Sebelas Maret University, Indonesia[2]

Optimization is a procedure to determining a set of arguments so that the optimum (maximum/minimum) value of a function is obtained. Optimization procedures have been widely used in science and engineering. This research discusses the method of determining search space - search space preprocessing - as an input for an optimization procedure, Particle Swarm Optimization (PSO). Optimization problems use a search space that contains solution candidates i.e. the parameter values that their limits are determined physically, or constrained. This research proposes a method to determine the lower-upper limit of search space using Response Surface Methodology. Response surface methodology is a combination of mathematical and statistical methods to design an experiment.

This research uses the PSO optimization strategy to determine the optimum set of arguments for several optimization performance test functions. The selected test function is a 2-dimensional function including: Bohachecsky function No. 1, Ackley function, Beale function, Booth function, Bukin function and McCormik function. The research results show that the modified search space obtained with response surface methodology can improve the accuracy and execution time of optimization results using PSO.

Keyword: Particle Swarm Optimization, regression analysis, Response Surface Methodology, search space

PAPER ID: 005

Energy Efficiency and Sustainable Economy: Design of High Voltage Pulse Generator in Pulse Electric Field for Honey Pasteurization

Lobes Hardiman[1.a], Ilham Priadhytama[1.b], Ihza Yoga Braswara[1.c]

Industrial Engineering Universitas Sebelas Maret, Indonesia[1]
Email: lobesherdiman@staff.uns.ac.id [a], priadythama@staff.uns.ac.id [b], ihzayoga12@student.uns.ac.id [c]

Abstract—Honey is a natural biological product that benefits humans as food and medicine. Badan Standardisasi Nasional (BSN) and the Kementerian Lingkungan Hidup dan Kehutanan (KLHK) assist honey producers in improving the quality of honey. The water content in honey can accelerate microorganisms' fermentation. Pasteurization can inhibit the fermentation process in honey. Conventional pasteurization of drinks is done by heating. However, heating to high temperatures can change the taste, color, and even nutritional content. This paper uses a high-voltage pulsed electric field (PEF) to discuss the non-thermal pasteurization process. The non-thermal pasteurization process designed in this research involves the application of a voltage between two electrodes that have been given a high DC voltage of up to 35kV. In the pasteurization process, three variations of voltage levels are used: 20kV, 25kV, and 35kV. Honey products that have been pasteurized will be tested for quality standards according to Honey Standard Nasional Indonesia (SNI) 8664:2018 by measuring the percentage of inactivated microbes in the microbiology laboratory. In the pasteurization process, energy efficiency is indicated at a voltage of 35 kV, which is 86.67%, and the total operational costs for 1 month are IDR 1.604.643. PEF technology improves energy efficiency performance and contributes to an energy-efficient, sustainable economy.

Keyword: PEF, flyback, energy efficiency, sustainable economy

PAPER ID: 006

Centralized Control of Multy-Energy for Enhanced Power in Islanded Microgrids

Adhi Kusmantoro[1.a]

Department of Electrical Engineering Universitas PGRI Semarang, Indonesia[1]
Email: adhikusmantoro@upgris.ac.id [a]

Providing a continuous source of electricity in rural areas has been a problem until now. However, renewable energy sources are very abundant for electricity generation. Therefore, the aim of this study is to propose centralized control of a microgrid system with multiple energy sources to supply residential loads. The proposed microgrid operates in island mode. The method used is to regulate the power flow of renewable energy sources and batteries with centralized control. Several energy sources are connected in parallel on a DC bus with a voltage level of 48 V. The microgrid operates in three modes, namely DG1 mode, DG2, and DG3 mode. The study results were tested using Matlab simulation. Centralized control is capable of regulating power flow to residential loads with two alternations.

Keywords: Microgrid, Centralized Control, PV Array, Residential Load, Multi-Energy

PAPER ID: 007

Seizure Prediction in Epilepsy Based on Electroencephalogram Signal (EEG)

Ridho Priambodo[1.a], Sutrisno Ibrahim[1.b], Joko Hariyono[1.c], Faisal Rahutomo[1], Subuh Pramono[1], Muhammad Hamka Ibrahim[1], Meiyanto Eko Sulistyo[1]

Department of Electrical Engineering, Sebelas Maret University, Surakarta, Indonesia[1]
Email: ridhopriambodo@student.uns.ac.id [a], sutrisno@staff.uns.ac.id [b], jokohariyono@staff.uns.ac.id [c]

Epilepsy is a neurological disorder that affects many individuals, with seizures as its primary symptom. Predicting seizures in epilepsy patients can be achieved based on EEG signals. In the EEG signals of epilepsy patients, there are four states: interictal, preictal (preseizure), ictal (seizure), and postictal (post-seizure). Detecting the preseizure condition is essential for predicting seizures in epilepsy patients. In this study, two machine learning methods are used for comparison: the K-Nearest Neighbor (KNN) method and the Long Short-Term Memory (LSTM) method. Both methods are employed to predict the preseizure condition in the EEG signals of patients. The prediction process comprises five stages: preprocessing, segmentation, feature extraction, classification, and final prediction. The developed system is then implemented in software applications to facilitate user interaction. The results of this study, utilizing the CHB-MIT dataset, indicate that the seizure detection system for epilepsy patients achieved a sensitivity of 80 %, a specificity of 92%, and an accuracy of 91% using the KNN method, and a sensitivity of 82%, a specificity of 87%, and an accuracy of 86% using the LSTM method. This research aims to improve treatment methods for epilepsy by enhancing understanding of seizure causes and patterns.

Keywords: Epilepsy, EEG, LSTM, KNN, Machine Learning, Prediction, Signal.

PAPER ID: 009

Packing Process Improvement In A Margarine Company using Sustainable Green Lean Six Sigma

Wulan Nurfitri[1.a], Cucuk Nur Rosyidi[2.b], Eko Pujiyanto[2.c]

Master Graduate Prorgam in Industiral Engineering Department, Faculty of Engineering, Sebelas Maret University, Surakarta, Indonesia[1]
Industiral Engineering Study Program, Faculty of Engineering, Sebelas Maret University, Surakarta, Indonesia [2]
Email: wulannurfitri@student.uns.ac.id [a], cucuknur@staff.uns.ac.id [b], ekopujiyanto@staff.uns.ac.id [c]

The impact of industrial growth causes the need for a concept that does not only look at the industry from an economic perspective. The concept of Sustainability can build a balanced society between economic, social, and environmental. Green Lean Six Sigma (GLSS) is a significantly different approach (Lean, Six Sigma, and Green Technology) to improve systems integration. The use of GLSS can identify wasteful activities, environmental impacts, and social impacts on the packaging process for margarine products quantitatively. Identification of wasteful activities in the packaging process for margarine products using Sustainability VSM (Sus-VSM). Measurement of resource use to identify environmental impacts on the packaging process using Life Cycle Assessment (LCA). In achieving social sustainability, it is necessary to use Social LCA (SO-LCA) quantitatively. Based on the priority matrix the most critical type of waste is waiting with the largest Total Project Priority value, which is equal to 720. Based on measurements using LCA, the contribution made by the components used for packaging is 20.7 kPt. Assessing the social aspects using the SO-LCA, only 2 of the 5 measured social aspects met the criteria.

Keywords: Packaging, GLSS, Sustainability

PAPER ID: 010

Agricultural posture risks assessment in the harvesting process using AWBA

Novia rahmawati[1.a], Dian Mardi Safitri[1.b], Anik Nur Habyba[1.c], Indah Permata Sari[1.d]

Department of Industrial Engineering Universitas Trisakti, Jakarta, Indonesia[1]

Email: novia.rahmawati@trisakti.ac.id [a], dianm@trisakti.ac.id [b], anik@trisakti.ac.id [c], indah.permatasari@trisakti.ac.id [d]

Abstract— Rice farming is an activity that requires a lot of human effort, one of the most risky activities is during the harvesting process. This process is mostly done with the posture of bending, squatting and shouldering. This posture can lead to the risk of musculoskeletal disorders (MSDs) for farmers. This study aims to analyse the results of agricultural risk assessment in the harvesting process. Data collection was carried out through observation and interviews with 6 farmers, namely 5 men and 1 woman, who harvested rice. The risk assessment method used is Agricultural Whole-Body Assessment (AWBA). The results of the interviews showed that farmers often complained of aches in their hip/thighs. In addition, the results of the AWBA risk assessment show that most of the working postures of farmers are at high risk, as is the case with the risk level of working duration which shows the final result of a very high-risk assessment.

Keywords: AWBA, MSDs, Agricultural posture risk

PAPER ID: 011

Feasibility and Wind Power Potential of Huancayo for Wind Turbine through a Simulated Model in Simulink

Leo Roger Capcha-Capcha[1.a], Caleb Josué Espinoza Huatuco[1.b], Diego Omar Chuquillanqui-Zurita[1.c], Manuel Michael Beraún-Espíritu[2.d], Ethan André Beraún-Arroyo[2.e]

School of Mechanical Engineering Universidad Continental Huancayo, Perú[1]
School of Mechatronics Engineering Universidad Continental Huancayo, Perú [2]
Email: 43523056@continental.edu.pe [a], 71872055@continental.edu.pe [b], 75687357@continental.edu.pe [c], mberaun@continental.edu.pe [d], 73225917@continental.edu.pe [e]

Abstract—At present, it is evident that it is urgently required to generate electrical energy sources that are the cleanest for the planet, as well as that they are characterized by starting from renewable primary energy sources. One of these most commonly used alternative energies is wind power, for its very good low-cost relationship with electricity generation and because it does not require many legislative permits from governments for its construction. The research in this article starts with an analysis of the existing wind in Huancayo, the average speed and density, and other fundamental variables to obtain a predictive model that finds the electrical power generated by a 1 MW wind turbine in the conditions of the city. Once the predictive mathematical modelling was carried out, a simulation was used with the MATLAB Simulink tool, in which it was obtained that under the wind conditions of Huancayo, the generator only produces a useful power of 297.7 KW, which represents 29.7% of the possible capacity of generation.

Keywords: Wind turbine, feasibility, wind potential, simulated model, average speed, and air density.

PAPER ID: 012

Judul Paper

Raymundus Lullus Lambang Govinda Hidayat[1.a], Budi Santoso[2], Fitrian Imaduddin[2], Ubaidillah[2]

Program Doktoral Ilmu Teknik Mesin Fakultas Teknik Universitas Sebelas Maret[1]
Program Studi Teknik Mesin Fakultas Teknik, Universitas Sebelas Maret[2]
Email: lulus_l@staff.uns.ac.id [a],

This paper discusses the simulation of a semi-active suspension system with magnetorheological (MR) dampers on a quarter car model. The simulation is performed using a state space approach. The state space approach can simplify the suspension system simulation process because the damping force components can be developed separately as function modules. This study applies the Bingham model, the Biviscous model, and the projection function model of MR damper developed by the author. The simulation results show that the projection function model can increase settling time by 29.86 %, 13.46 % and 13.56 % respectively compared to the passive suspension system, the suspension system with the Bingham model and the suspension system with the Biviskos model.

Keywords: MR Damper, Bingham model, Biviskos model, projection function model, semi-active suspension system.

PAPER ID: 013

A Systematic Literature Review of Technology Transition for Electric Motorcycle Markets in Digital Economic Systems

Roni Zakaria Raung[1.a], Wahyudi Sutopo[1.b], Muhammad Hisjam[1.c], Djoni Hartono[1.d]

Teknik Industri, Fakultas Teknik, Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: ronizakaria@staff.uns.ac.id [a], wahyudisutopa@staff.uns.ac.id [b], hisjam@staff.uns.ac.id [c], djoni.hartono@ui.ac.id [d]

The growth of the technology transition market, especially electric motorcycles, can be accelerated by subsidies and incentives provided by the government or can also involve the role of digital markets (e-commerce or ride-hailing platforms). The market competition in the digital economic system differs from the conventional economic system. Concerns about unfair market competition, such as mergers, cartels, etc., should be avoided by antitrust law. This article reviews other articles related to market competition behavior by market leaders in the digital economic system and electric vehicles, especially electric motorcycles. This article aims to see trends, directions, and research opportunities related to the topic in the future. The method used in this article is bibliometric, using VOS Viewer. The most frequently occurring keywords are competition. The results of the content analysis of the article in terms of the most used method are exploratory and explanatory methods, the most studied objects are electric vehicles and IT services provider, and the most surveyed countries are US countries. The output of this article will provide an overview of future research opportunities and directions in designing a conceptual model of market competition policy by the ruler of the electric motorcycle market in the digital economic system.

Keywords: Technology Transition, Electric Motorcycles, Subsidies and Incentives, E-commerce, Market Competition, Bibliometric

PAPER ID: 014

Implementation of Porter's Generic Strategies in International Airlines Industry Post-Covid-19 Pandemic (Case Study: Qatar Airways and AirAsia)

Raymond N. Rusli[1.a], Bryan D. Setiawan[1.b], Hana Latifah[1.c], Irzhafarina Aldayondri[1.d], Nurhadi Wibowo[2.e], Ellia Kristiningrum[2.f], Ajun Tri Setyoko[2.g]

Industrial Engineering Department Faculty of Engineering, Universitas Indonesia, Depok, Indonesia[1]
National Research and Innovation Agency-Republic of Indonesia (BRIN-RI), KST BJ, Habibie, Serpong, Indonesia[2]
Email: raymond.nathanael@ui.ac.id [a], bryan.daud@ui.ac.id [b], hana.latifah@ui.ac.id [c], irzhafarina.aldayondri@ui.ac.id [d], nurh4diwibowo@gmail.com [e], kristiningrum.e81@gmail.com [f], ajuntrisetyoko@gmail.com [g]

Airlines Industry was severely impacted by the COVID-19 pandemic. However, there are several airlines that bounced back with excellent performance in the post pandemic due to the implementation of effective strategies in those companies. This research examines the implementation of Porter's generic strategies in the international airlines industry post-COVID-19 pandemic. The paper uses Qatar Airways and AirAsia as case studies and their annual report as the supporting data. As a result, Qatar Airways has adopted a differentiation strategy, while AirAsia has adopted a cost leadership strategy. Both strategies have been successful in the post-COVID-19 era. The paper concludes that the best strategy for an airline will depend on a number of factors, including the airline's target market, its financial resources, and the competitive landscape.

Keywords: Porter's Generic Strategies, Airlines Industry, COVID-19, Cost Leadership, Differentiation, Company Strategy

PAPER ID: 015

Porter's Generic Strategic Implementation Analysis on Dairy Product Companies in Indonesia

Alif Nadhif Rabbani[1.a], Fara Rahmania Izzaty[1.b], Nada Hadiqah[1.c], Syafira Nurin Aqmarina[1.d], Nurhadi Wibowo[2.e], Ella Kristiningrum[2.f], Ajun Tri Setyoko[2.g]

Industrial Engineering, Faculty of Engineering, Universitas Indonesia, Jawa Barat, Indonesia[1]
National research and Innovation Agency Indonesia[2]
Email: alifnadhifr@gmail.com [a], fararahmaniaizzaty@gmail.com [b], nada.hadiqah@gmail.com [c], syfiranurin@gmail.com [d], nurh4diwibowo@gmail.com [e], kristiningrum.e81@gmail.com [f], ajuntrisetyoko@gmail.com [g]

Indonesia's dairy market has been experiencing rapid growth in recent years. The competition in the market is increasingly challenging along with the fast development and wide range of dairy products. Competitive advantage affects the product offered and how it meets the target customer better than the competitor. Porter's generic strategies can be used to identify companies' competitive advantage by assessing the company strategies into three types: cost leadership, differentiation, and focus. Four dairy-based milk FMCG companies (Indomilk, Ultra Milk, Diamond Milk, and Cimory Milk) were compared to find out the strategy adopted through the product prices at the same retail, UHT milk flavor variations, and target customers of the companies. Analysis using data sources obtained from the company's annual report (2017-2021) found that Indomilk and Ultra Milk implemented the best-value type 2, while Cimory Milk adopted the differentiation strategy or type 3, and Diamond Milk implemented the low-cost focus type 4 strategy. Despite the four companies having the same dairy product type (UHT milk), the companies have made good strides to sustain their competitiveness through adopted strategies.

Keywords: UHT milk, Porter's generic strategies, competitive advantage, sustainable

PAPER ID: 016

Characterization of Glass Waste Resulting from Milling Process for Reuse as Filler in Brake Friction Composites

Martinus Heru Palmiyanto[1.a], Kaleb Priyanto[2.b], Bambang Hari Priyambodo[2.c]

Manufacturing Engineering Universitas Negeri Yogyakarta, Yogyakarta, Indonesia[1]
Mechanical Engineering Department Sekolah Tinggi Teknologi Warga Surakarta, Surakarta, Indonesia[2]
Email: martinus76palmiyanto@gmail.com [a], kaleb@sttw.ac.id [b], bambang.hari.priyambodo@gmail.com c

The characteristics of glass powder have been studied using XRF, TGA, and SEM testing techniques. The purpose of this research is to provide information about the chemical composition, thermal properties, and microstructure of glass powder. XRF testing is used to determine the chemical composition of glass powder, while TGA is a technique used to measure the thermal properties of samples. SEM is used to examine the microstructure of glass powder. The results of the XRF test, obtained the presence of SiO2 as the main element forming the glass network. The weight percentage of SiO2 is 65.58%. The next dominant element is CaO with a weight of 21.34%, 4.34% MgO and 2.26% Al2O3. SEM observation results, glass powder has a uniform size. SEM analysis results obtained particle size distribution of glass powder with an average size of 41 µm. The measurement results obtained the smallest particle size of 10 µm and the largest size of 80µm. TGA analysis obtained a purity of 85% SiO2 at 950o C. Analysis of the results showed that the glass powder has good thermal properties, and has a homogeneous and orderly microstructure. This information is considered useful in the development of glass powder materials for brake friction composites applications.

Keywords: glass powder, composite, XRF, TGA, SEM

PAPER ID: 017

A Review Of Universal Design Approach To Persons With Disabilities Access In Train Stations Facilities, 1997-2022

Akh. Sohibi[1.a], Bambang Suhardi[1.b], Pringgo Widyo Laksono[1.c], Sugiono[2.d]

Department Industrial of Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Department of Industrial Engineering Universitas Brawijaya, Malang, Indonesia[2]
Email: akh.sokhibi@student.uns.ac.id [a], bambangsuhardi@staff.uns.ac.id [b], pringgowidyo@staff.uns.ac.id [c], sugiono_ub@ub.ac.id [d]

Accessibility refers to the ease of reaching both physical and non-physical services. It is closely related to persons with disabilities, who have a right to accessibility. Equal access to public transportation, especially rail transportation, is one of these rights. Despite regulations that ensure access for people with disabilities, they still face obstacles in accessing rail transportation. Thus, action is needed to address these obstacles. Universal design is a design that accommodates all groups, including those with disabilities, in rail transportation. There has been much research on universal design in European, American, and East Asian countries. To this end, a literature review on the universal design approach to disability access in train station facilities was conducted. This study used the Prisma method for the literature review. The data collection process was carried out in four stages: identification, screening, eligibility, and inclusion. The data was collected only from Scopus-indexed international journal sources. From 1997 to 2022, 27 papers on universal design approaches to disability access in train station facilities were obtained. The study found that almost all train station facilities, including parking, ramps, entrances, information displays, stairs, elevators, escalators, lifts, ticket counters, waiting rooms, platforms, guide blocks, handrails, and toilets, can be approached using universal design for disability access. A suggestion for future studies is a literature review on universal design approaches in railroad cars.

Keywords: accessibility, person with disabilities, universal design, train station

PAPER ID: 018

Indonesia's Fast-Moving Consumer Goods Industries Strategic Analysis in Response to The World Primary Producers Conflict Issue

Aldi Damora Siregar[1.a], Fitria Indah Astari[1.b], Nabila Farah Raissa Maharani[1.c], Nurhadi Wibowo[1.d]

Department of Industrial Engineering, Faculty of Engineering, Universitas Indonesia, Jakarta, Indonesia [1]
Email: aldidamorasiregar@gmail.com [a], fitriaindahastari@gmail.com [b], nblfarah12@gmail.com [c], nurh4diwibowo@gmail.com [d]

Due to the conflict between Russia-Ukraine, the FMCG industry faces many challenges in its effort to remain competitive, and the FMCG industry in Indonesia is no exception. The study used Porter's Generic Strategies to analyze three FMCG companies in Indonesia, i.e., PT Indofood Sukses Makmur Tbk, PT Garuda Putra Putri Jaya Tbk, and PT Mayora Indah Tbk. The data was obtained from the company's annual report from 2018 to 2022. The findings reveal that despite limitations in raw stock availability, all three companies successfully implemented Porter's Generic Strategies. These companies achieved competitive advantage and positive financial outcomes despite the limited raw stock during the Russia-Ukraine conflict. Based on profitability ratios, PT Indofood Sukses Makmur Tbk exhibited superior performance to the other companies during the conflict. However, this investigation relied on limited secondary data, highlighting the need for future research to incorporate primary data and a broader range of factors, such as management decisions, market dynamics, and external trends.

Keywords: FMCG, Porter's Generic Strategies, business strategy, Russia-Ukraine's conflict

PAPER ID: 019

The Post-Covid Indonesia's Aviation Business Strategic Recovery Plan (Case Study: Citilink Indonesia and Lion Air Indonesia)

Aryan Chandra Budiman[1.a], Muhammad Dzaky Fajratama[1.b], Disma Nidya Ghaisani[1.c], Rahmat Nurchayo[1.d]

Industrial Engineering Department Universitas Indonesia, Depok, Indonesia[1]
Email: aryan.chandra21@ui.ac.id [a], muhammad.dzaky22@ui.ac.id [b], disma.nidya@ui.ac.id [c], rahmat@eng.ui.ac.id [d]

The post Covid-19 pandemic has profoundly impacted the turning point of the Indonesian aviation industry's business growth. This study aims to analyze alternative strategic recovery plans between the two low-cost airline players in Indonesia: Citilink and Lion Air using Porter's Cost Leadership Framework. A qualitative approach is carried out based on relevant sources, and a comprehensive review of previous scientific studies. The findings reveal that the pandemic caused a significant decline in passenger demand, financial losses, and operational disruptions for both airlines. However, the two airlines were still able to maintain their businesses and successfully survive through the challenging conditions by implementing cost leadership strategies. Despite the decline in air passenger demand, based on report from the Indonesian National Air Carriers Association (INACA) recorded that the number of domestic flights reached 33.36 million passengers in 2021. Lion Air was noted as the airline with the largest market share in domestic flights throughout the past year and Citilink ranked second with a domestic flight market share.

Keywords: Indonesian Airlines, Business Strategic, Aviation, Cost Leadership, Citilink, Lion Air

PAPER ID: 020

CAE Design of a Camera Oriented Soft Robot in Surgical Interventions

Fernando Richard Porras-Atao[1.a], Cesar Daniel Giu-Charapaqui[1.b], Renan Alberto Chupos-Damian[1.c], Manuel Michael Beraún-Espíritu[2.d], Ethan André Beraún-Arroyo[2.e]

School of Mechanical Engineering Universidad Continental Huancayo, Perú[1]
School of Mechatronics Engineering Universidad Continental Huancayo, Perú [2]
Email: 75972790@continental.edu.pe [a], 73535689@continental.edu.pe [b], 71075187@continental.edu.pe [c], mberaun@continental.edu.pe [d], 73225917@continental.edu.pe [e]

Soft robotics is emerging as a promising option to improve endoscopic surgeries, as it allows the creation of safer, more precise and adaptable robots for the human body. Soft robots are able to move smoothly and flexibly, reducing the risk of damage to organs and tissues. They can also adapt to different body sizes and shapes, which makes them especially useful in difficult-to-access surgical procedures. While developments in soft robotics exist in other parts of the world, in the country where the study is being conducted, no specific approaches for endoscopic interventions have been found. Considering the indications presented in the medical literature and the limitations of conventional laparoscopic surgeries, the article describes the design of a soft robot for endoscopic surgery. It begins by providing information on the components and processes involved in the design. Tools such as the morphological matrix, black box and flowchart are used to guide the process. Next, a conceptual design is made using Inventor software, detailing the mechanical parts of the soft robot. Once the mechanical design is completed, the electronic control of the robot is designed. Finally, the soft robot is tested in the laboratory.

Keywords: Soft robot, Endoscopy, Robotic, surgical interventions.

PAPER ID: 021

Redesign of TechnoCool Vest using Reusable Dry Ice Sheets as a Preventive Action of Heat Exhaustion in Indonesian Hajj Pilgrims

Muhammad Naufal Aditya Nugraha[1.a], Lobes Herdiman[1.b], Roni Zakaria[1.c]

Department of Industrial Engineering Sebelas Maret University, Surakarta, Indonesia[1]

Email: naufaladitya210@gmail.com [a], lobesh@gmail.com [b], ronizakaria@staff.uns.ac.id [c]

The Hajj, one of the five pillars of the Muslim faith, occurs outdoors in and surrounding Mecca in the Saudi Arabia desert. The elderly are at high risk of heat-related illness (HRI) during the Hajj. TechnoCool Vest is a microclimate assistive device that protects from heat illness. Six Indonesian Air Force personnel became subjects in testing the efficacy of using TechnoCool Vest on physiological and subjective responses at the Depohar Surakarta field. Subjects were selected based on the similarity in the appearance of fatigue due to exposure to environmental heat between the subject and elderly Indonesian pilgrims. During the test, the environmental exposure was 25.70 ± 0.20°C wet bulb temperature, 40.80 ± 3.80°C globe temperature, dry bulb temperature 32.00 ± 0.01°C, and 45.50 ± 2.50% relative humidity. Head and body temperature was significantly lower when wearing TechnoCool Vest. Based on Pugh's matrix scoring and calculation of IREQ, the Piramida-type TechnoCool Vest is the best suited for maintaining individual temperatures in a hot environment.

Keywords: Heat-related illness; Pugh's matrix scoring; TechnoCool Vest

PAPER ID: 022

Eye Movement Classification Based On Electrooculography (EOG) Signals To Control Objects In Games

Nathania Angelica[1.a], Pringgo Widyo Laksono[1.b], Cucuk Nur Rosyidi[1.c], Muhammad Ilhamdi Rusydi[2.d], Retno Wulan Damayanti[1.e], Eko Pujiyanto[1.f]

Department of Industrial Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Department of Electrical Engineering Universitas Andalas, Padang, Indonesia[2]
Email: nathaniaangie@student.uns.ac.id [a], pringgo@ft.uns.ac.id [b], cucuknur@staff.uns.ac.id [c], rusyidi@eng.unand.ac.id [d], rwd@ft.uns.ac.id [e], ekopujiyanto@ft.uns.ac.id [f]

Electrooculography (EOG) is a method for recording, measuring, and providing information about potentials in the cornea and retina as a result of changes in the position and movement of the eyeball. EOG signals can be utilized for eye movement classification which can be applied to various applications especially for people with physical disabilities such as wheelchair control, mobile robot control, and game control. This paper proposes a technique to record and process EOG signals using 2 methods on signal smoothing namely moving average and locally estimated scatterplot smoothing (LOESS) and using Log Difference Absolute Standard Deviation (LDASD) Feature on feature extraction. Using these techniques, the data accuracy rate with the prediction results reached 100%. The data used in this study amounted to 40 signal records from 15 volunteers and 25 signal samples for the accuracy testing stage. The results of this study are expected to be implemented in games to be played by persons with physical disabilities with the concept of endless running, where the object control needed is to move right, left, and jump.

Keywords: Biosignal, Electrooculography, game control, moving average, LOESS, LDASD.

PAPER ID: 023

Multicriteria Classification of Drug Inventory Using Fuzzy BWM, Fuzzy TOPSIS, ABC and Determination of Optimal Inventory Using Periodic Review Approach (R, s, S) (Case Study at Hospital Pharmacy Installation)

Dwi Sulistyo Widya Habsari[1,a], Wakhid Ahmad Jauhari[1], Cucuk Nur Rosyidi[1]

Department of Industrial Engineering, Sebelas Maret University, Solo, Indonesia[1]
Email: widyahabsari09@student.uns.ac.id [a]

Proper management of drugs is crucial to ensure that they are always available with optimal stock. The responsibility of managing drug supplies lies with the Hospital Pharmacy Installation. However, pharmaceutical installations often face the problem of overstocking several types of drugs which take up a lot of storage space. Moreover, overstocking causes some drugs to exceed their shelf life limits, leading to wastage. A study was conducted to group drugs and determine the best supply policy for reducing the total supply cost. The drugs were classified based on their importance, considering multiple criteria using fuzzy BWM, Fuzzy TOPSIS, and ABC Classification. Then, for class A drugs, the optimal inventory and total inventory cost were calculated using Periodic Review (R, s, S) with different review period (R) scenarios proposed, namely R for 2, 3, 4, 5, and 6 weeks for a 3-month inventory period. The results show that the Periodic Review policy with an R of 2 weeks has the smallest total inventory cost of IDR 313,099,783, accounting for 84.5% because it has the smallest total inventory quantity. Meanwhile, the current policy has the highest total cost of IDR 2,016,828,246 because it has the highest total inventory quantity during the 3-month inventory period. Therefore, the Periodic Review policy with an R of 2 weeks can be proposed as the optimal inventory determination policy for hospitals.

Keywords: ABC Classification, Fuzzy BWM, Fuzzy TOPSIS, Inventory Cost, Periodic Review

PAPER ID: 024

Solar Power System Installation and Power Quality Analysis at Pesantren Hubbul Khoir Indonesia

Adriel Satrio Nugroho[1], Sutrisno W. Ibrahim[1.a], Muhammad Nizam[1], Faisal Rahutomo[1], Meiyanto Eko Sulistyo[1], Joko Hariyono[1], Subuh Pramono[1], Muhammad Hamka Ibrahim[1]

Department of Electrical Engineering, Sebelas Maret University, Surakarta, Indonesia[1]
Email: sutrisno@staff.uns.ac.id [a]

Electricity is very crucial in human life today. Electricity is used in communication, education, offices, household appliances, and transportation. Unfortunately, most of the electricity in Indonesia is still generated by fossil fuels such as coal. There needs to be a transition to renewable electrical energy generation so that electricity can be produced continuously. One option is solar power generation. Solar panels use radiation from the sun to generate electricity. Indonesia, which is located on the equator, has an advantage in solar power generation. Every region in Indonesia gets sunlight for a full year. This paper describes the analysis of the 1.62 kWp solar power generation system installed at Hubbul Khoir Islamic Boarding School. The analysis includes economic analysis, power quality analysis, and power quality analysis from an economic point of view. The results obtained by the PLTS system will return capital in 6.8 years and can get Rp20,871,282.00 after 25 years, the power quality of the PLTS system is good, and the power quality can affect from an economic point of view.

Keywords: renewable energy, solar panel, power quality

PAPER ID: 025

Smart Solar Powered Thermostat using Fuzzy Rule Based Regression and Internet of Things

Wirarama Wedashwara[1], Made Sutha Yadnya[2], Windah Anugrah Subaidah[3], I Wayan Agus Arimbawa[1]

Department of Informatics Engineering University of Mataram, Mataram, Indonesia[1]
Department of Electrical Engineering University of Mataram, Mataram, Indonesia[1]
Department of Pharmacy University of Mataram, Mataram, Indonesia[1]
Email: alamat@email[a], alamat@email[b]

Hydroponics systems require a Thermostat to regulate the water temperature. Environmental conditions affect changes in water temperature, so it requires analysis of environmental variables such as air temperature and humidity, light intensity, and the temperature of the water itself. The research developed a solar-powered intelligent thermostat system using the Fuzzy Rule-Based Regression (FRBR) algorithm and the Internet of Things. The FRBR algorithm is used to regress the use of electrical energy used for thermostat purposes and hot and cold-water pumps produced by ceramic element heaters. The IoT system consists of two-element ceramic heaters and a pump that is controlled using a relay module triggered by a water temperature sensor. The environmental sensors used are air temperature and humidity sensors and light intensity as precedents of the rule. While dependent consists of temperature, Total Dissolved Solids (TDS) in water, and energy consumption. The test was carried out using a hydroponics system wick with three air conditions, namely sunny, overcast, and rainy. The association rule mining evaluation showed that FRBR produced 12 main rules with average support of 0.424 and confidence of 0.824. Regression results showed a mean square error (MSE) of 0.339 for water temperature and TDS and 0.141 for electrical energy consumption. The results showed that the system built did not change the TDS value in water so in the future comparison of TDS values will be carried out without and with the thermostat system.

Keywords: Hydroponics, Internet of Things, Fuzzy Rule Based Regression.

PAPER ID: 026

Distributed Naive Bayes Technique For Sentiment Analysis Of Amazon Customer Reviews

Baiq Wilda Al Aluf[1.a], Husnul Khotimah[1.b], Muhammad Ari Rifqi[1.c], Gibran Satya Nugraha[1.d], Ari Hernawan[1.e]

Department of Informatics Engineering University of Mataram, Mataram, Indonesia[1]
Email: baiqaluf88@gmail.com [a], husnulhk31@gmail.com [b], 27.aririfqi@gmail.com [c], gibransn@unram.ac.id [d], arihernawan@unram.ac.id [e]

Big data analysis is an essential tool and technique for understanding large datasets, with the condition that the algorithms used can handle large amounts of data. To address this, Apache Spark is employed as a parallel computing framework that can operate across multiple clusters. This research utilizes the Naive Bayes classification method to analyze positive and negative customer reviews on Amazon's website. The objective of this study is to measure the performance of distributed Naïve Bayes and observe the running time required for text classification in sentiment analysis of user reviews on the Amazon website using Apache Spark. Evaluating the running time is used to assess the efficiency of data processing with Apache Spark. The results of implementing Naive Bayes on Spark using 4 node workers and 3 datasets demonstrate success, as the model achieves good accuracy, namely 82.31% for a dataset size of 500 MB, 82.42% for 1000 MB, and 82.23% for 1500 MB, all with efficient processing times using 4 worker nodes. Significant reductions in running time are observed when varying the number of node workers used. However, for a broader understanding of system performance in more complex scenarios, further research is required, such as exploring the use of more than 4 node workers. Thus, this research serves as a promising initial step in expanding our understanding of system performance in more complex conditions.

Keywords: Big Data, Apache Spark, Naive Bayes, Distributed Computing, Customer Review Classification of Amazon

PAPER ID: 027

Optimised Design of a Hydraulic Cylinder for Elevator Construction: A Balance Between Cost and Efficiency

Manuel Michael Beraún-Espíritu[1.a], Ketty Marilú Moscoso-Paucarchuco[2.b], Alfredo Huamán-Cuya[2.c], Luis Antonio Visurraga-Camargo[2.d], Joaquin Machaca-Rejas[3.e], Wilfredo Fredy Paco-Huamani[4.f]

School of Mechanical Engineering Universidad Continental Huancayo, Perú[1]
Universidad Nacional Autónoma Altoandina de Tarma, Tarma, Perú[2]
Universidad Nacional José María Arguedas, Andahuaylas, Perú[3]
Universidad Nacional de Huancavelica, Huancavelica, Perú[4]
Email: mberaun@continental.edu.pe [a], kmoscoso@unaat.edu.pe [b], ahuaman@unaat.edu.pe [c], lvisurraga@unaat.edu.pe [d], jmachaca@unajma.edu.pe [e], wilfredo.paco@unh.edu.pe [f]

This scientific article addresses a fundamental issue in mechanical engineering: the design of a hydraulic cylinder applied in the construction of elevators. Based on a real project needed in the company Mad Machine Sac in Cusco-Peru, we propose an efficient and sustainable solution to this challenge. The key to our design lies in the implementation of an original formulation with attention to the balance between cost factors, efficiency, and project constraints. Throughout the study, various methodologies existing in the literature were used, following the standards of the German VDI 2221 and VDI 2225. One of our contributions lies in the presentation of a comprehensive analysis of the costs of materials and labor employed, which is necessary for any project planning of this nature. Finally, this study lays the foundation for future research by providing a guide for the design of hydraulic cylinder systems in the elevator and adjacent fields. This work is a valuable resource for academics and industrialists seeking effective mechanical design solutions.

Keywords: Hydraulic Cylinder Design, Elevator Construction, Cost-Efficiency Balance, Material Cost Analysis and Mechanical Engineering.

PAPER ID: 028

SoC Estimation of Lithium Battery Using Hybrid Data-Driven and Equivalent Circuit Model

Muhammad Dzaky Ashidqi[1.a], Adha Imam Cahyadi[1.b], Ahmad Ataka[1.c]

Department of Electrical Engineering Gadjah Mada University, Yogyakarta, Indonesia[1]
Email: muhammaddzakyashidqi@mail.ugm.ac.id [a], adha.imam@ugm.ac.id [b], ahmad.ataka.ar@mail.ugm.ac.id [c]

Researchers have conducted extensive studies on estimating the State of Charge (SoC) of Lithium-Ion Batteries (LIB). Among the various approaches developed by many researchers, the most precise method involves utilizing a data- driven approach. However, despite its accuracy, the implementation of the data-driven method for SoC estimation necessitates substantial computational resources. Therefore, when applied to an embedded system, it demands a controller with high specifications, resulting in increased costs. To address the aforementioned issues, a solution for estimating the State of Charge (SoC) is presented, utilizing an equivalent circuit model (ECM) and a lightweight perceptron algorithm. The battery is represented by an equivalent circuit, specifically the first order Thevenin model. By employing this model, various parameters such as internal resistance, open circuit voltage, and R-C voltage are derived through a lightweight perceptron model. The perceptron model is trained using 300 cycles of experimental data obtained from LFP batteries. These parameters are determined by fitting the battery test data, minimizing the root-mean-squared error (RMSE) between the measured terminal voltage and the voltage output of the model. From this model open circuit voltage in every cycle can be predicted by fitting internal resistance obtained from perceptron training with SoC data acquired from the experiment through the Polynomial Regression method. The result shows that the SoC model using the proposed method can obtain 93.8% accuracy compared to actual SoC measured with standard Coulomb Counting method with small computational resources and minimum parameters from lightweight neural network model that consist of only two neurons on one hidden layer. So, this method can provide a lightweight SoC estimation algorithm with acceptable accuracy.

Keyword: component, formatting, style, styling, insert

PAPER ID: 029

The Development of Tourism Models based on Tourist Participation to Increase Safety and Enjoyable Factors in Tourist Destinations

Trio Jonathan Teja Kusuma[1.a], Susy Susmartini[1.b], Bambang Suhardi[1.c], Lobes Hardiman[1.d]

Industrial Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: trio.yonathan@gmail.com [a], susy_susmartini2015@staff.uns.ac.id [b], bambangsuhardi@staff.uns.ac.id [c], lobesherdiman@staff.uns.ac.id [d]

The safety factor is very crucial considering the increasing diversity of tourist destinations that have different risks that can be categorized as low, medium, high, and extreme. Therefore, a model is proposed that considers safety factors and involves tourists in tourism development. The model consists of 4 layers. The first layer is the outermost layer which is the stakeholder. Stakeholders consist of government, community, private sector, academics, media, and tourists. This first layer will coordinate and collaborate to provide factors in the second layer. The second layer is a determining factor for the superiority of a tourist destination. The second layer contains Attractions, Accessibility, Amenity, Ancillary, Safety, and enjoyment. The realization of these 4 pillars will carry out sustainable tourism. From the observations, it can be seen that the involvement of stakeholders in the development of tourist destinations is very important. The proposed tourism development model is expected to be able to develop better tourist destinations. The development of tourist destinations will involve tourists actively participating. Tourists are no longer an object, but a subject in determining the determinants of the superiority of tourist destinations. One of the factors of excellence proposed is safety. Safety in tourist destinations must consider enjoyment. Because of this, it is necessary to involve tourists in determining safety criteria while still considering enjoyability.

Keyword: tourism, safety, enjoyable, tourist involvement

PAPER ID: 030

Analysis of Common Mode Voltage on Dual fed Induction Motor with New Modulation Technique

Ketut Wiryajati[1.a], I Nyoman Wahyu Satiawan[1.b], Ida Bagus Fery Citarsa[1.c], I Made Budi Suksmadana[1.d], Supriono[1.e]

Department of Electrical and Electronics University of Mataram, Lombok, Indonesia[1]
Email: kjatiwirya@unram.ac.id [a], nwahyus@unram.ac.id [b], ferycitarsa@unram.ac.id[c], mdbudisuk@unram.ac.id [d], supriono@unram.ac.id [e]

This paper discusses the Common mode Voltage and Current, which is generated by a multilevel inverter for supplying an induction motor. The proposed technique for modulating inverter named as Mixed Divider Switching (MDS). The working principle of the proposed technique is that by changing the frequency of switching in one side, and by keeping a constant frequency on the other side. The technique is verified and simulation using MATLAB/SIMULINK software. The simulation results that the proposed structure produces a significant value of common mode voltage / common mode current. The value of common mode voltage / current increases with the reduction of the modulation indices

Keywords: common mode voltage; mixed divider switching; multilevel inverter

PAPER ID: 031

Compensator Design for Voltage Dip Mitigation and Power Factor Correction on Microgrid with Internet of Things (IoT) Based Monitoring

Muhammad Nizam[1.a], Feri Adriyanto[1.b], Rizal Mujaddid Irsyad[1.c], Mufti Reza Aulia Putra[1.d]

Department of Electrical Engineering, Faculty of Engineering, Sebelas Maret University, Surakarta, Indonesia[1]
Email: muhammad.nizam@staff.uns.ac.id [a], feri.adriyanto@staff.uns.ac.id [b], rizalmujaddidirsyad@student.uns.ac.id [c], muftireza@staff.uns.ac.id [d]

Renewable energy sources such as solar panels and wind turbines are intermittent or unstable. Due to the instability, it can cause problems, namely the voltage dip. On the other hand, the existing electrical equipment is mostly inductive loads can also be a new problem. This is due to the excessive use of inductive loads resulting in a decrease in the power factor. These two problems have an impact on increasing the kVA requirement, decreasing efficiency, and lowering the quality of electricity due to voltage drop. In this research, a power compensator consisting of voltage dip mitigation and power factor correction is made as a solution to overcome these two problems. In the voltage dip mitigation circuit, testing has been successfully carried out with different fault time ranges. There were five tests with a period time of 4s, 3s, 2s, 1s, and 500ms. Based on these experiments, it was found that the average relay operating time or working time of the relay when dealing with disturbances is 19ms. In the power factor correction circuit, with 8 types of inductive load variations, the compensator can increase the power factor beyond 0.9 and can reach 1. There is an increase in the percentage value of the power factor between 17-30% from the average initial power factor value of 0.74 to 0. 95. So the design of this power compensator has succeeded in overcoming the problem of voltage drops and improving the power factor.

Keywords: Compensator, Voltage Dip, Power Factor, Operating Time, Capacitive, Inductive

PAPER ID: 032

Proof of Concept for the Design of a Semi-Automatic Hydraulic Extruder in the Manufacture of Cake Bricks: Towards Improved Efficiency and Quality Standards

Walter Junior Capcha-Sanabria[1.a], Nestor Ccama-Taipe[1.b], Tonny Roger Villanueva-Mendoza[1.c], Manuel Michael Beraún-Espíritu[1.d]

School of Mechanical Engineering Universidad Continental Huancayo, Perú[1]
Email: 76925013@continental.edu.pe [a], 46688611@continental.edu.pe [b], 44114358@continental.edu.pe [c], mberaun@continental.edu.pe [d]

The exploration of new and effective technologies for the creation of building materials plays an essential role in improving the efficiency and quality of structures. The production of fired clay blocks has awakened a growing interest in the industrial field, which has given rise to the need to develop specialized machinery capable of generating the product in a more optimal way. In this context, an innovative concept regarding a semi-automatic hydraulic extrusion machine for the manufacture of bricks for confectionery is introduced. The study covers an overview of the process, focusing on the conception of a semi-automatic hydraulic extrusion machine oriented to the manufacture of bricks for confectionery, taking advantage of the SolidWorks software application for the future design of said machinery.

Keywords: Innovative technologies, pastry bricks, SolidWorks, and design software.

PAPER ID: 033

Analysis of Energy Use and Energy Saving Potential : A Case Study of a Manufacturing Company in Indonesia

Agus Ramelan[1.a], Royyan Nurbiksa Jaka Pratama[1.b], Joko Slamet Saputro[1.c], Muhammad Nizam[1.d], Warindi[1.e], Chico Hermanu Brillianto Apribowo[1.f]

Department of Electrical Engineering, Sebelas Maret University, Surakarta, Indonesia[1]
Email: agusramelan@staff.uns.ac.id [a], royyannurbiksa7@student.uns.ac.id [b], jssaputro89@staff.uns.ac.id [c], muhammad.nizam@staff.uns.ac.id [d], warindi@staff.uns.ac.id [e], chico@ft.uns.ac.id [f]

Most industry requires a large amount of energy supply to support business needs. Energy use that is not properly controlled can result in increasing energy cost for the company. Energy Management System (EnMS) is an option in the energy use control process by performing energy audit that analyze energy use to identify potential energy savings. In this research, the authors conducted an energy audit in a manufacturing industry in the Republic of Indonesia to evaluate energy use, calculate losses, find potential energy savings, provide recommendations for improvements, and carry out technical economic analysis that focuses on analyzing electrical systems, air conditioning, lighting, and induction motor to reach a certain value. The factory has an actual energy consumption of 2667.11 MWh/year with annual electricity costs reaching IDR 4.1 billion with an EnPI value of 354.35 kWh/m2/year or 29.53 kWh/m2/month. The results showed that the potential for energy consumption savings reached 382.15 MWh/year, the company's EnPI value fell to 301.20 kWh/m2/year or 25.10 kWh/m2/month with the reduced cost of IDR 469,912,259.20/year.

Keywords: Efficiency, Energy Audit, Energy Management System (EnMS), Manufacturing

PAPER ID: 034

Gateway Smart Environment Monitoring

Sahirul Alim Tri Bawono[1.a], Abdul Aziz[1.b], Nanang Maulana Yoeseph[1.c], Rudi Hartono[1.d], Agus Purbayu[1.e], Masbahah[1.f], Yusuf Fadlila Rachman[1.g]

Department of Informatics Engineering, Vocasional School, Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: sahirul@staff.uns.ac.id [a], aaziz@staff.uns.ac.id [b], nanang.my@staff.uns.ac.id[c], rudi.hartono@staff.uns.ac.id [d], bayoe@staff.uns.ac.id [e], masbahah@staff.uns.ac.id [f], yusuf_fadil@staff.uns.ac.id [g]

Today's IoT technology is not only a medium for remote control but also a monitoring medium. The monitoring process requires a process and storage area to store the history of the monitored data. In IoT, this storage has a position in the middle, namely between the micro controls in the device with monitoring applications, which can be computer or mobile phone-based applications.

This study aims to create monitoring data storage media from micro-control devices and analyze the success of making the media. To make this storage media, use the PHP Programming Language to manage what data is stored and use the Express Framework for sending data from devices to storage media and convey monitoring data to applications that are in the end user. Applications for Webserver media and databases are noSQL-based Apache and MongoDB.

Gateway Smart Environment Monitoring can store monitoring data in a dynamic format according to the needs and each tool installed. The Smart Environment Monitoring Gateway can also send these storable data sets to end-user applications in JSON format.

Keywords: Internet of Things, Gateway Smart Environment Monitoring, Monitoring System.

PAPER ID: 035

Design of Education Game as a Media For StudyingAncient Human History in Indonesia

Ibnu Qoyim Al Hafidz[1], Sutrisno Ibrahim[1,a], Meiyanto Eko Sulistyo[1]

Electrical Engineering Department, Sebelas Maret University Surakarta Indonesia[1]
Email: sutrisno@staff.uns.ac.id [a]

Weather conditions or when the rainy season is uncertain makes washing clothes as a routine human activity difficult because the rain comes erratically, one of the problems is when it's time to dry the clothes and then after a while it rains, which results in drying the clothes taking a long time and making it lazy to put the clothes in. into the shade and this problem supports making the design of automatic drying equipment important. With the help of a microcontroller, it will read the input from the light and humidity sensors and then send instructions to the driving motor to control the drying device to automatically move to the shade or in the sun. This tool can be controlled manually with the help of an Android smartphone application so that we can control the clothesline without being influenced by sensors or our will if we want to pull the clothes into the shade. The sensor data is then stored if there is a request from the user and then displayed on the online site. The advantage of the design in this system is that it is real-time with an update time every minute and a web server is used to display the stored data for access.

Keyword: Clustering, Automatic Sunning Tool, Prediction, Rainfall, Drying Clothes

PAPER ID: 036

Production Process Improvement in the Textile Industry: Using Lean Manufacturing Tools to Increase Efficiency and Quality

Estefani Vilcahuaman-Carhuamaca[1.a], Paola Grace Sanabria-Blancas[1.b], Luis Cristhian Vasquez-Topalaya[1.c], Christian Javier Bejarano Pérez[1.d]

School of industrial Engiennering, Universidad Continental Huancayo-Perú[1]
Email: 73229306@continental.edu.pe [a], 62144214@continental.edu.pe [b], 78009496@continental.edu.pe [c], cbejarano@continental.edu.pe [d]

This study focuses on analyzing the textile industry, its history and evolution over time, as well as the challenges it faces today in terms of efficiency and competitiveness in the global market. It highlights the crucial role played by the introduction of manufacturing machinery in Europe and America during the Industrial Revolution in driving chain production and the development of textile materials such as cotton. The specific case of the textile company "Madeleine" is also addressed, identifying its main production problems and proposing solutions based on lean manufacturing tools. Tools such as the Ishikawa Diagram, the Flow Diagram, and the Pareto Diagram are used to analyze the causes of problems and improve efficiency at each stage of the production process. The study reveals that the company has managed to improve its production and quality control by implementing lean manufacturing tools, which have led to a significant increase in sales and improvements in product quality. However, it also highlights that many textile companies in Peru have not yet successfully implemented these strategies, which prevents them from being more competitive in the international market.

Keyword: *Textile industry, Lean manufacturing, efficiency continuous improvement.*

PAPER ID: 037

The Arc Current Effect on Structure and Resistance of Nano Particles

Riski Rama Kusuma[1.a], Miftahul Anwar[1.b], Feri Adriyanto[1]

Department of Electrical Engineering, Universitas Sebelas Maret Surakarta, Indonesia[1]
Email: riskiramakusuma@gmail.com[a], miftahwar@ft.uns.ac.id [b]

There are generally three methods used in carbon nanotube synthesis: laser ablation, chemical vapor deposition, and arc discharge. The submerged arc discharge method uses distilled water liquid medium instead of the vacuum chamber. Graphite electrodes with 99.9% carbon purity in tubes with a diameter of 10 mm were used as anodes and cathodes. The anode and cathode were mounted horizontally on the welding clamp. The experiment was conducted four times withvariations in current usage of 10A, 40A, 70A, and 100A. TEM (Transmission Electron Microcopy) analysis was conducted to determine the structure and size of the carbon nanoparticlesproduced. Resistance testing using the Elkahfi tool by adding 15mg of nanoparticles into 5ml aquades will then be measured with two probes connected to the Elkahfi 100 I-V Meter. The difference in the formation current affects the size of the nanoparticles produced, resulting in differences in the ability of the nanoparticles to withstand the rate of electrons. The submerge arc discharge experiment recorded the lowest resistance value at a current of 40A.

Keyword: Arc Disharge, CNT, I-V Characteristics, Nano Particle, TEM

PAPER ID: 038

Proposed Improvement Of Digilib XYZ Website Based On User Experience Analysis

Putri Sausan Kis Hanifah[1.a], Irwan Iftadi[1.b], Rahmaniyah Dwi Astuti[1.c]

Department of Industrial Engineering Faculty of Engineering, Sebelas Maret University Surakarta, Indonesia[1]
Email: putrisausankis@gmail.com [a], irwaniftadi@staff.uns.ac.id [b], rahmaniyahdwi@staff.uns.ac.id [c]

Abstract— XYZ Digital Library or better known as Digilib XYZ is an institutional repository website owned by XYZ University which provides libraries by the XYZ academic community. The development of the Digilib XYZ website is currently based on input from XYZ librarians and lecturers, and has not directly involved Digilib XYZ users. Even though in developing a website, input from users who are users of the product is needed. Development in accordance with what theusers wants can produce user satisfaction in using the website.Therefore, to increase user satisfaction, it is necessary to develop the Digilib XYZ website in a directed and targeted manner based on user experience. This research tries to improve the Digilib XYZ website based on user experience through user experience lifecycle method. The method consists of four stages, namely analyze, design, prototype, and evaluation. The analyze phase aims to find out the needs and problems of Digilib XYZ users. The design stages aim to design a user interface for improving the Digilib XYZ. The prototype stages aim to present proposals for improving the Digilib XYZ which will be developed through prototype. The evaluation stage aims to evaluate the prototype for the repair of the Digilib XYZ website.based on the result of research, the result of the prototype for repairing the Digilib XYZ website with the evaluation results using the System Usability Scale questionnaire obtained a value of 77.34. This value is goods and shows website improvement acceptable to users.

Keyword: *Institutional Repository, User Experience, User Experience Lifecycle, Usability*

PAPER ID: 039

Fuzzy C Means Algorithm for Predicting Student Graduation Timeliness in the Department of Electrical Engineering of Sebelas Maret University

Feri Adriyanto[1.a], Mohd Zainizan Sahdan[2.b], Yusuf Athallah Adriyansyah[3.c]

Department Electrical Engineering Sebelas Maret University Surakarta, Indonesia[1]
Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia[2]
Department Intelligent Computing and Analytics Universiti Teknikal Malaysia Melaka Malaysia[3]
Email: feri.adriyanto@staff.uns.ac.id [a], zainizan@uthm.edu.my [b], B032010458@student.utem.edu.my [c]

One of the important variables for higher education certification is timely graduation. There are various methods for predicting student graduation. One of them employs the fuzzy C-means method, which may forecast the timeliness of student graduation. The Fuzzy C Means technique is advantageous in that it can conduct unsupervised clustering. Gender, GPA, credits from semester one to semester four, leave status, work status, marital status, and graduation status are all utilized to determine when students graduate. Preparation, modeling, prediction, and procedure are all accurate in the proposed application model. The Python programming language is used in the application's console application. Using the pandas, xlrd, fuzzy-c-means, and sklearn libraries, application development can be completed rapidly. Syntax and functional tests demonstrate that the application is functional. The Fuzzy C Means method has 73.33% accuracy in predicting student graduation time.

Keyword: Fuzzy C Mean, Python programming language, Predicting Student Graduation Timeliness

PAPER ID: 040

Audit and Monitoring on Electrical Energy Consumption at Soedarsono Hospital, Pasuruan City

Faiq Izzul Islami [1,a] , Joko Haryono [1,b], Feri Adriyanto [1,c]

Department Electrical Engineering Universitas Sebelas Maret Surakarta, Indonesia[1]
Email: faiqizzul@student.uns.ac.id [a], jokoharyono@staff.uns.ac.id [b], feri.adriyanto@staff.uns.ac.id [c]

Energy audit is a proactive measure aimed at reducing electricity consumption without compromising the comfort of building occupants. The energy audit was conducted at RSUD Soedarsono Kota Pasuruan, where various energy-saving opportunities were identified to achieve energy efficiency. The methodology employed in the preliminary energy consumption audit involved the collection and compilation of data on energy usage at RSUD Soedarsono Pasuruan. The required data included technical architectural drawings from the archives of RSUD Soedarsono Kota Pasuruan, encompassing blueprints of the architecture, lighting design for the entire building, installed electrical diagrams, annual electricity expenditures, and the building's location. The hospital building has an installed capacity of 500 kVA, approximately 0.5 MW, and an additional backup power of 1.5 MW from three generators. The installed loads in the hospital consist of a lighting system with a capacity of 106.678 kW and an air conditioning system with a capacity of 871.2415 kW. Given the energy-intensive nature of RSUD Soedarsono Kota Pasuruan's building criteria for the years 2022-2023, energy- saving efforts are required to meet the energy-intensive criteria with an Intensity of Energy Consumption (IKE) ranging from 50 to 95 kWh/m2/year. This necessitates reducing electricity consumption to at least 877.374,731 kWh per year. The audit results indicate that by implementing the energy-saving opportunities recommended by the auditor, the total electricity energy savings amount to 375.654,97 kWh per year. Furthermore, the current Intensity of Energy Consumption (IKE) of 26.789 kWh/m2/year demonstrates a highly efficient level. If these measures are implemented, the forward projection reveals an energy saving potential of 1.431.975,0288 kWh per year, equivalent to a 10% reduction in the Average Total Power Consumption over one year at the hospital.

Keyword: *Energy audit, electricity consumption, energy savings, energi efficiency, RSUD Soedarsono Kota Pasuruan, energy audit methods.*

PAPER ID: 041

Risk Mitigation Strategy of Blood Procurement in Blood Supply Chain Using the Hazard Identification Risk Assessment & Determining Control (HIRADC)

G.R. Irwanda [1, a], A. Mansur[1,b]

Department of Industrial Engineering, Islamic University of Indonesia, Indonesia[1]
Email: gustiirwanda10@gmail.com [a], agusmansur@uii.ac.id [b]

Procurement of bloodstock is necessary for the surrounding community for emergency and medical purposes. In the procurement of blood stocks, possible risks will arise, and the severity and potential impacts vary as well as different risk level categories. This study aims to determine the risk factors most significantly influencing and implementing the proposed blood bank management strategy. This research used a case study in the Indonesian Red Cross (UTD PMI Pekanbaru) as a blood bank. The HIRADC method is used to determine the level of risk and classify the level of risk categories. After knowing the level of the risk category, risk management is carried out to minimize the risk. In this study, the creation of mitigation strategies using SWOT analysis and the Quantitative Strategic Planning Matrix (QSPM) to determine the priorities strategically. The results of this study indicate the implementation of the proposed system can handle the potential risks that arise in the process of procurement of bloodstock in PMI Pekanbaru..

Keyword: Procurement risk, blood supply chain, mitigation strategy

PAPER ID: 042

Mining Site Selection in Lateritic Nickel Ore Deposits: A Conceptual Model

Benazir Imam Arif Muttaqin[1.2.a], Udisubakti Ciptomulyono[1], Nurhadi Siswanto[1]

Department of Industrial and Systems Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia[1]
Department of Industrial Engineering, Institut Teknologi Telkom Surabaya, Surabaya 60231, Indonesia[2]
Email: benazir.imam.a.m@gmail.com [a], udisubakti@ie.its.ac.id [b], siswanto@ie.its.ac.id [c]

The increasing need for energy in recent years has triggered an increasing exploration for mining of important commodities, such as nickel. Lateritic nickel ore (laterite ore) is a type of ore that dominates nickel reserves globally. This ore can be mined through open pit mining. In sustainable mining, mining companies are required to choose the best mining location based on three aspects: economic, environmental, and social. So far, the trend of problem research in mineral mining is still increasing. However, based on literature studies, there are still very few models that can be used to help companies choose mining locations, especially for open pit mining of nickel ore. This article conceptually models the problem with this phenomenon. So that it helps decision-makers in nickel mining companies make the best decisions. The results of the conceptual model developed in this article can then be used as a reference in mathematical modeling to determine the best nickel laterite ore mining location.

Keywords: nickel, laterite ore, open pit mining, sustainable mining, conceptual model

PAPER ID: 043

Prototype of IoT-Based Monitoring System of a Small-Scale Solar Power Plant in the Refugia Gardens of Magetan Regency

Anas Hibatullah Djoko Susilo[1.a], Aulia Rahmat Tsani Wibisono[1], Azalia Ananta Firdaus[1], Bintang Ramadhan[1], Muhammad Faiz Adzkia[1], D Warindi[1], Miftahul Anwar[1.b]

Electrical Engineering Department, Sebelas Maret University, Surakarta, Indonesia[1]
Email: anas.hibat99@student.uns.ac.id [a], miftahwar@staff.uns.ac.id [b]

Renewable Energy (RE) is an alternative source of energy supply because apart from having a low impact on environmental damage, it also guarantees energy sustainability into the future [1]. In this study, the renewable energy used is solar energy which is captured and converted into electrical energy by solar panels. Solar energy is an energy source in a lighting system that will be installed as a Solar Power Plant in Refugia Gardens, Magetan Regency. This research was conducted to design and develop a small-scale Solar Power Plant with an Internet of Things (IoT) based monitoring system to facilitate maintenance using Renewable Energy (RE). In addition, this research is expected to educate the public regarding Renewable Energy (RE) and as an effort to support the government in achieving renewable energy targets. This research has outputs in the form of a ready-to-install Solar Power Plant prototype in Refugia Gardens, Magetan Regency.

Keyword: Internet of Things, Renewable Energy, Solar Power Plant.

PAPER ID: 044

60 Watt Peak Solar Power Plant for Hydroponic Agriculture in Support of Smart Farming 4.0

Catya Afif Kasudya[1.a], Sutrisno Ibrahim[1.b], Faisal Rahutomo[1.c], Meiyanto Eko Sulistyo[1.d] , Joko Hariyono[1.e]

Electrical Engineering Department, Sebelas Maret University, Surakarta, Indonesia[1]
Email: catyaafif@student.uns.ac.id [a], sutrisno@staff.uns.ac.id [b], faisal_r@staff.uns.ac.id [c], mekosulistyo@staff.uns.ac.id [d], jokoharyono@staff.uns.ac.id [e]

In this paper we describe our developed solar power plant for hydroponics agriculture. The components used in designing solar power plants consist of 60 WP monocrystalline solar panel modules, 10 A solar charge controller, 300 W inverter and 12 V 9 Ah battery, and wiring installation. The results of the solar power system implementation show that the system can run well, able to supply electrical energy to run the water pump for at least 7 hours a day and fulfil its function as the main source of electricity until the harvest period of hydroponic plants for approximately 30 days.

Keyword: *Solar Power Plant, Solar Panels, Electrical Energy, Hydroponics*

PAPER ID: 045

Design of local controller for Autonomous Electric Vehicle

Rendra Dwi Firmansyah[1.a], Joko Slamet Saputro[2.b], Miftahul Anwar[2.c], Feri Adriyanto[2.d], Fakih Irsyadi[3.e], Adi Waskito[1.f]

Smart Mechatronics Research Center National Research and Innovation Agency (BRIN), Bandung, Indonesia[1]
Electrical Engineering Department, Sebelas Maret University, Surakarta, Indonesia[2]
Electric Engineering and Informatics, Vocational College, Universitas Gadjah Mada Sleman, Yogyakarta[3]
Email: rend004@brin.go.id [a], jssaputro89@staff.uns.ac.id [b], miftahwar@staff.uns.ac.id [c], feri.adriyanto@staff.uns.ac.id [d], fakih.irsyadi@ugm.ac.id [e], adiw005@brin.go.id [f]

Abstract— The development of electric vehicles in Indonesia is increasing rapidly, it is projected that by 2030 the demand for electric cars in Indonesia will reach 2.2 million units. This shows that the trend of using electric cars in Indonesia is increasing. Electric vehicle technology is also developing rapidly, one of which is autonomous vehicle technology. This autonomous vehicle technology is believed to be able to reduce the problem of traffic jams and accidents. The paper proposes an architecture that combines both centralized and distributed elements. The architecture includes a master controller and a local controller Based on the experimental results, it can be concluded that the local controller system has functioned properly.

Keyword: Clustering, Automatic Sunning Tool, Prediction, Rainfall, Drying Clothes

PAPER ID: 046

Development and design of an automated grading system for passion fruit using computer vision

Cristian Ever Fernandez-Inga[1.a], Antonny Jober Huaman-Quispe[1.b], Yevgueni Eugenio Orellana-Llacta[1.c], Manuel Michael Beraún-Espíritu[1.d], Richard Cáceres-Ortiz[1.e]

School of Mechatronic Engineering Universidad Continental Huancayo, Perú[1]
Email: 71582767@continental.edu.pe [a], 75990468@continental.edu.pe [b], 72607324@continental.edu.pe [c], mberaun@continental.edu.pe [d], rcacereso@continental.edu.pe [e]

In recent years, the integration of advanced technologies, such as computer vision and automation, has transformed various industries, including agriculture. Among agricultural products, granadilla, a fruit with high nutritional value and increasing global demand, has become a significant focus for improving productivity and product quality. Conventional manual sorting methods for granadilla are laborious, time-consuming, and error-prone, prompting researchers to explore automated sorting systems with cutting- edge technologies. In this article, we propose a novel approach for automating granadilla classification based on computer vision and machine learning techniques. Our system, integrating a Raspberry Pi 4 with a high-resolution camera and an Arduino Mega for real-time processing and control, demonstrates robust performance in accurately identifying granadillas of different quality grades. This research contributes to the advancement of automated sorting systems for agricultural products, promoting sustainable agricultural practices and enhancing economic growth in the agricultural sector. The article presents an overview of the system design, electronic components, and control mechanism, followed by detailed software implementation of computer vision algorithms and intelligent decision-making processes. Experimental results and performance evaluation of the proposed system are presented, showcasing an efficiency margin of 80% in granadilla classification. This work represents a significant step in harnessing advanced technologies to enhance agricultural practices and sets the stage for future research in this field.

Keyword: *Automated classification, Granadilla, Computer vision, Machine learning.*

PAPER ID: 047

Improving quality function deployment method by integrating Kano and sensory profile analysis into the house of quality matrix

Gusti Fauza[1.a], Setyaningrum Ariviani[1.b], Viska Wandhira Wimaryana[1.c], Hari Prasetyo[2.d], Dimas RA Muhammad[1.e], Dian R Affandi[1.f]

Department of Food Science and Technology, Faculty of Agriculture Universitas Sebelas Maret, Surakarta, Indonesia [1]
Department of Industrial Engineering Universitas Muhammadiyah Surakarta, Surakarta, Indonesia[2]
Email gustifauza@staff.uns.ac.id [a], setyaningrum_ariviani@staff.uns.ac.id [b], viskawandhira27@gmail.com [c], Hari.prasetyo@ums.ac.id [d], dimasrahadian@staff.uns.ac.id [e], dianrachmawanti@staff.uns.ac.id [f]

The aim of this research is to improve the performance of quality function deployment (QFD) method when it is used to develop a food product. Kano model is implemented to capture and analyze the consumers' voice while the quantitative descriptive analysis is utilized to characterize the sensory profile of the product. Five samples of steamed brownies produced by bakery outlets in Surakarta were evaluated where one of those samples is the developed product. 25 consumers were interviewed to describe the quality attribute of the steam brownies where 15 panelists were elected and trained to characterize the sensory profile of the steamed brownies. A focus group discussion was conducted and result on 12 quality attributes that divided into 1) intrinsic quality e.g., taste, texture, aroma, appearance, 2) extrinsic quality e.g., attractive design of package, additional information (social media, tagline), ingredient information on package, trustworthy, brand image, availability (easy to get), material used to pack the product and box design. On the other hand, the trained panelist described 5 sensory attributes that relate to the intrinsic quality e.g., sweet chocolate taste, chocolate aroma, sweet aroma, hardness, and smoothness texture. The benchmarking result in HOQ shows that one sample outperformed the develop product in all intrinsic qualities where the taste is the most important attribute for customer. As well as the extrinsic quality, one sample also defeated the developed product where ingredient information is crucial for customers

Keyword: *quality function deployment, Kano model, sensory profiles, voice of customer*

PAPER ID: 049

Logistic Packaging and Its Impact on Company's Logistic System: A Systematic Literature Review

Tulus Martua Sihombing[1.a], Susy Sumartini[1.b] Retno Wulan Damayanti[1.c], Lobes Sudirman[1.d]

Departemen Industrial Engineering Universitas Sebelas Maret Surakarta, Surakarta, Indonesia[1]
Email: tulusmartuasihombing@student.uns.ac.id [a], susy_susmartini2015@staff.uns.ac.id [b], retnowulan@staff.uns.ac.id [c], lobesherdiman@staff.uns.ac.id [d]

Packaging logistics play a crucial role in business performance, adding value to the company by enhancing logistics efficiency throughout the supply chain. While previous research focused on the activity chain's efficiency aspect, current research trends shift towards exploring the added value of logistics packaging development. This study uses a Systematic Literature Review to analyze journal papers published from 2004 to 2022, aiming to identify research trends in the logistics packaging domain within the engineering field. EndNote and VOSviewer software visualize the bibliometric network and explore novel research topics based on titles, abstracts, and keywords. The study shows an increase in research on logistics packaging and its potential to improve logistics systems. Future research could focus on the impact of developing logistics packaging systems, particularly transport packaging, on logistics system performance. The findings contribute to academic and industry communities by presenting research trends, clarifying state-of-the-art packaging logistics, and emphasizing the importance of strategic decision-making in packaging logistics.

Keyword: *development of design, logistics system, systematic literature review, packaging logistics, value-added*

PAPER ID: 050

A Retrofitting Design for Enhance Performance of Autonomous Electric Vehicle Prototype

Syaifullah Filard Latifan[1.a], Joko Slamet Saputro[1.b] Miftahul Anwar[1..c], Feri Adriyanto[1.d], Agus Ramelan[1.e]

Departemen Industrial Engineering Universitas Sebelas Maret Surakarta, Surakarta, Indonesia[1]
Email: ifan.sfl7@student.uns.ac.id [a], jssaputro89@staff.uns.ac.id [b], miftahwar@staff.uns.ac.id [c], feri.adriyanto@staff.uns.ac.id [d], agusramelan@staff.uns.ac.id [e]

This paper explores the performance enhancement of an Autonomous Electric Vehicle (AEV) prototype using a lane-keeping method. The initial prototype showed satisfactory results but encountered operational challenges. To address these issues, a retrofitting plan was proposed, resulting in significant improvements in the AEV prototype's performance. A new teleoperation system was designed, enabling basic maneuver control and mode switching through radio frequency communication. Data analysis revealed the remote control's precision with a minimal input error of 2.75 bits (1%) and delay response times ranging from 300 to 1,444ms. Additionally, the retrofit design for the speed sensor effectively reduced the required pulses per rotation to 416 and utilizing better materials. On the other hand, the steering mechanism underwent substantial upgrades, replacing the gear material with stronger Polylactic Acid (PLA) and adjusting the gear scaling for an expanded steering range detection. Comparative analysis demonstrated that the mini-PC Jetson TX2 NX outperformed the Raspberry Pi 4B in most categories, meeting current and future requirements. Although challenges persist in the remote controller, overall, the AEV prototype's performance has significantly improved, laying the foundation for further advancements in autonomous driving systems.

Keyword: AEV prototype, performance enhancement, retrofitting plan, data analysis, benchmarking.

PAPER ID: 051

Predicting Tourist Sentiment Analysis:Leveraging the Power of TF-IDF Feature Extraction (TF-IDF FE) Models for Effective Tourism Promotion

Hartatik[1.a], R. Rizal Isnanto[2.b], Budi Warsito[2.c]

Department of Informatics Engineering, Vocational School Universitas Sebelas Maret, Surakarta, Indonesia[1]
School of Postgraduate Studies, Diponegoro University, Semarang, Indonesia[2]
Email: hartatik119@staff.uns.ac.id [a], rizal_isnanto@undip.ac.id [b], budiwarsito1975@gmail.com [c]

The tourism and hospitality industry has a significant impact on the global economy in bigdata era, highlighting the role of technological advances, especially in social media, in shaping visitor preferences and behavior. This research focuses on how sentiment analysis is assisted by the Natural Language Processing (NLP) word embedding model and TF-IDF (Term Frequency-Inverse Document Frequency) to increase prediction accuracy. The dataset used is tourism data in the hospitality sector and then categorized as positive or negative accurately as customer preferences, contributing to research in developing smart tourism and improving tourism infrastructure. The evaluation results show that the sentiment analysis prediction model implementing TF-IDF, which was trained using a dataset of 515.212 reviews from users in tourism and hositallity, provides good performance, reaching an accuracy of 91%. Visualization and sentiment prediction results are carried out using Python.

Keyword: *sentiment analysis, preference analysis, bigdata, Data Science, tf-idf, predicting*

PAPER ID: 052

Microservices Implementation for Information System of Nuraksa Forest Park

Royana Afwani[1.a], M Yusril Raihan[1.b], Nadiyasari Agitha[1.c], Sri Endang Anjarwani[1.d], Budi Irmawati[1.d], Moh Ali Albar[1.e]

Department Informatics Engineering, Faculty of Engineering, University of Mataram, Indonesia[1]
Email: royana@unram.ac.id [a], yusrilraihan28@gmail.com [b], nadiya@unram.ac.id [c], endang@unram.ac.id [d], Budi-i@unram.ac.id [e], mohalialbar@unram.ac.id [f]

Tahura Nuraksa, or community forest park, is a natural conservation area to collect natural or non-natural plants and animals used for science, education, supporting cultivation, culture, tourism, and recreation. The Conservation Information System is a centralized and digital sustainable management of conservation data, geographical landscape data, vegetation, animal data, and other helpful information for the government, academics, and the public. So, it is essential to prepare for sustainable system development with a microservice architecture model, which allows for better scaling and faster development because each service/application can be used and updated separately. In this research, the design and implementation of an application module for Tahura, namely the flora and fauna mapping system, was carried out using a microservices architecture, and it will become an example of system development in the long term for developing services and other features.

The methodology used in this research adopts the Design Science Research Process for Information Systems (DSRP), with stages: Service Decomposition, Interprocess Communication, Transaction Managing Data, and Application Design. The created application was built with the framework ReactJs for websites, React Native for mobile, databases MongoDB, and Postman for service test (GET, POST, PUT, and DELETE methods). Meanwhile, for feature testing applications using the lack box technique, Selenium IDE for website functionality, and Mean Opinion Score for measuring system performance based on Officer/Admin and tourists view. The results of microservices for this system are suitable in the following aspects: scalable, adaptable, deployable, and maintainable.

Keyword: *Microservices, Information System, Services.*

PAPER ID: 053

Design And Construction of Current And Voltage Monitoring System For Plasma Arc Discharge In Water As Nano Particle Fabrication

Ahmad Hanif Shalahuddin[1.a], Miftahul Anwar[1.b], Feri Adriyanto[1]

Department of Electrical Engineering,Faculty of Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: ahmadhanifsalladin@student.uns.ac.id [a], miftahwar@ft.uns.ac.id [b]

The nanoparticle fabrication process can use the plasma arc discharge method submerged in water. This process uses graphite electrodes immersed in water. Two pieces of graphite are dipped and brought closer to each other and then flown by an electric current. An arc will appear at a certain distance from the graphite that is brought closer to each other. From the spark, the current and voltage can be measured by passing through the two pieces of graphite. The monitoring system is designed to read the current and voltage that pass through the two graphites when they are brought close to each other and an arc appears in the plasma arc discharge process in water. The monitoring system is made using several components, such as the WCS 1500 hall effect sensor, which is used to read the current passing through the graphite, Arduino Mega 2560 as the microcontroller, which processes the data obtained; resistor used for voltage divider scheme, the laptop is used to display the data, and the OriginLab software to process the data from the research results obtained with the current set at currents of 10 A, 40 A, 70 A, and 100 A on the inverter. The development of the monitoring system can read and display current, voltage, and power when an arc discharge occurs. The development of the monitoring system can read and display current, voltage, and power when an arc discharge occurs. From the data shown in the Intrustar monitoring system as a comparison, the data read will be similar to it, with the highest level of current accuracy when the input current is set at 10 A, which is 95.38%, and the highest voltage accuracy occurs at the input current of 70 A with value 85.9%.

Keyword: *Plasma Arc Discharge, Monitoring System, Nanoparticle Fabrication.*

PAPER ID: 054

Induction Motor Speed Control with PID Tuned by Particle Swarm Optimization

Hari Maghfiroh.[1.2.a], Meiyanto Eko Sulistyo[1.b], Alfian Ma'arif[3.c], Nia Maharani Raharja[4.d], Iswanto Suwarno[5.e], Muhammad Ahmad Baballe[6.f]

Department of Electrical Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Department of Electrical and Information Eng Universitas Gadjah Mada, Yogyakarta, Indonesia[2]
Department of Electrical Engineering Universitas Ahmad Dahlan, Yogyakarta, Indonesia[3]
Universitas Islam Negeri Sunan Kalijaga, Yogyakarta, Indonesia[4]
Department of Electrical Engineering Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia[5]
Department of Mechatronic Engineering Kano State Polytechnic Kano State, Nigeria[6]
Email: hari.maghfiroh@staff.uns.ac.id [a], hari.maghfiroh@staff.uns.ac.id [b], alfianmaarif@ee.uad.ac.id [c], nia.raharja@uin-suka.ac.id [d], iswanto_te@umy.ac.id [e], mbaballe@kanopoly.edu.ng [f]

The induction motor is the most prevalent form of asynchronous motor due to its low cost, simple yet robust design, ease of maintenance, and reliability. In this study, speed control of the induction motor in combination with vector control is proposed. PID as the simple and widely used method is proposed. The particle swarm optimization (PSO) is used to tune the PID parameters. First, the small signal model is derived from a detailed induction motor (IM) which mimics the real system. Second, the tuning process is done in the state space model. Finally, the controller was applied to the detailed model and compared with the PID. Simulation testing in both speed and load variation shows that PID-PSO with IAE objective function can significantly reduce the IAE. PID-PSO has lower IAE than PID by 37.79% and 14.76% for speed variation and load variation respectively. However, in terms of settling time, there is no improvement. Therefore, for future development, multi-objective functions can be used.

Keyword: *induction motor, speed control, PID, PSO*

PAPER ID: 055

Intelligent System for Cyberbullying Detection on Twitter Using Naïve Bayes Classifier and Logistic Regression Classification

Winarno[1.a], Achmad Arief Rahmana S[1.b], Bambang Harjito[1.c]

Informatics Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: win@staff.uns.ac.id [a], rizal_isnanto@undip.ac.id [b], budiwarsito1975@gmail.com [c]

Popular and easily accessible social media platforms are widespread in society today. However, their usage also brings about negative impacts, such as cyberbullying—a phenomenon that involves aggressive and demeaning actions through digital platforms or social media, causing psychological and physical harm to the victims. This growing concern regarding cyberbullying is further substantiated by a survey conducted in August 2021, encompassing ,077 junior and senior high school students in Indonesia. To tackle this issue, this research proposed an intelligent system that could predict the nature of tweets. The system harnessed the power of two classification algorithms, namely Naïve Bayes Classifier and Logistic Regression Classification. This research start from data collection followed by text processing. The next step is vectorization using TF-IDF and followed by classifying and deploying the intelligent system. The results showed that Naïve Bayes Classifier achieved an accuracy of 74%, while Logistic Regression Classification outperformed with an accuracy of 84%. With these promising outcomes, deploying a web-based intelligent system could mitigate cyberbullying with good accuracy. This intelligent system can be accessed via https://uns.id/winarNBCLRC

Keyword: *Intelligent System, Sentiment Analysis, Naïve Bayes, Cyberbullying, and Logistic Regression*

PAPER ID: 057

Performance Evaluation of A Parallel Air-Cooled Battery Pack

Inayati Inayati[1.a], Mufti Reza Aulia Putra[2.b], Muhammad Nizam[2.c]

Department Chemical Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Department Electrical Engineering Universitas Sebelas Maret, Surakarta, Indonesia[2]
Email: inayati@staff.uns.ac.id [a], muftireza@staff.uns.ac.id [b], muhammad.nizam@staff.uns.ac.id [c]

This work was aimed to evaluate the performance of air-cooling system designed for battery packs holder. Overall heat transfer coefficient was calculated based on the design of the air-cooling system. Battery holder was planned to be placed in a closed container, contained of 112 LFP batteries, arranged in 4 module and vertically stacked. Each module consisted of 28 LiFePO4 cylindrical batteries. Eleven copper cooling pipes were mounted vertically to absorb the dissipated heat during charging or discharging process. Cooling air entered from the manifold at the bottom of the container and left at the top of the container. In this work, cooling system was evaluated for one through system. Varied charge and discharge current, from 1C to 7C were set in this work. Performance of the cooling system was evaluated at the maximum linear velocity of the air cooling, i.e., 0.5 m/s, with the inlet temperature of 303 K. The results showed that the ΔLMTD average was around 17 K, convective heat transfer coefficients (hi and hio) were 1590 W/m2 .K and 1526 W/m2 .K, respectively. Clean overall heat transfer coefficient (Uc) was 1375.4 W/m2 .K and dirty overall heat transfer coefficient (Ud) were in the range of 12 to 640 1375.4. Design fouling factor (Rd) was in the range of 0.0008 m2 .K/W to 0.0813, which were higher that required Rd, i.e., 0.00035 m2 .K/W. In conclusion, the designed parallel air-cooled system for the battery pack will be able to dissipate produced heat when the charging/discharging current up to 7C.

Keyword: *BTMS, battery pack, simulation, air-cooling*

PAPER ID: 058

DEVELOPMENT OF MATERIAL POLYESTER COMPOSITES REINFORCED HYBRID FIBER OF HIBISCUS TILIACEUST BARK AND PALM FIBER AS A LEVELER TO SUPPORT AGRICULTURAL MECHANIZATION

Sujita Darmo[1.a], Achmad Zainuri[1.b], Sinarep Sinarep[1.c], Nasmi Herlina Sari[1.d]

Department of Mechanical Engineering University of Mataram, Mataram, Indonesia[1]
Email: sujita@unram.ac.id [a], zainuri_a@unram.ac.id [b], sinarep@unram.ac.id [c], n.herlinasari@unram.ac.id [d]

Leveler (harrow comb) is an agricultural equipment that functions to destroy, level agricultural land before planting rice seeds. The leveler is made of low carbon steel, the drawback is that it is easy to corrode, wear resistance is low, the production process is difficult, so it is expensive. So it is necessary to improve the quality of the leveler, using a hybrid natural fiber reinforced composite polyester material. The advantages of natural fibers compared to synthetic fibers are: abundant availability in nature, low production costs, low density, easy processing and handling, non-toxic, non-corroded. In this study, the characterization of the mechanical properties of polyester composites reinforced by hybrid fiber of Hibiscus tiliaceust bark and palm fiber was carried out. In this study, the characterization of the mechanical properties of polyester composites reinforced by Hibiscus tiliaceust bark fiber and palm fiber hybrids was carried out. The tests carried out were in the form of the ASTM D 256 standard impact test and the ASTM G99-95 standard wear resistance test. In conclusion, impact toughness (impact energy per unit area) and wear resistance of hybrid fiber reinforced polyester composites are affected by palm fiber volume fraction. As the palm fiber volume fraction increases, the impact toughness decreases, but the wear resistance increases.

Keyword: *polyester composite, hybrid fiber, Hibiscus tiliaceust bark fiber, palm fiber*

PAPER ID: 059

DC Motor Control Using PID Control Method On Electric Vehicle Prototypes

Joko Slamet Saputro[1.a], Miftahul Anwar, Fery Adriyanto[1.b], Wahono Aji Warjono[1.c], Putra Maulana Yusuf[1.d], M. Shafiy Widi Kresno Wibisono[1.e]

Department Electrical Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]

Email: jssaputro89@staff.uns.ac.id [a], miftahwar@staff.uns.ac.id [b], feri.adriyanto@staff.uns.ac.id [c], wahonoaji92@student.uns.ac.id [d], putramy18@student.uns.ac.id [e], wibishafy@student.uns.ac.id [f]

Abstract—Electric vehicles (EV) are one of the hot topics at the moment. There are already 4.8 million electric vehicles in use worldwide. These vehicles use a DC motor for movement. In the course of the further development of electric vehicles, in addition to further development, various features are also realized and further developed. Collectively known as Advanced Driver Assistance Systems (ADAS), these features include ollision avoidance, pedestrian detection, intelligent cruise control, adaptive cruise control, and more. In order for these functions to work properly, powerful DC motors are required to enable the rapid movement of the vehicle. DC motors have an advantage of easy control and low price. In its implementation, the DC motor must be analyzed regarding the response and controlled to improve the response. One of the methods used in control is PID. This PID control method will be applied to autonomous vehicle research using an electric vehicle prototype. This research aims to achieve better control of DC motors used in electric vehicle prototypes in autonomous vehicle research. The motor used is the RS-545 12V 2A DC motor by going through the PID control design process, the results are obtained in the form of a fit value of 96.97%. Then, there is a rise time value of 1.939, settling time of 11.513 and overshoot of 0.022.

Keyword: *Control, DC Motor, Electric Vehicles, PID*

PAPER ID: 060

Enhancing the Readability of Academic Data for Machine Learning through Preprocessing Techniques

Anna Mayyah Soraya[1.a], Miftahul Anwar[1.b], Faisal Rahutomo[1.c]

Electrical Engineering Department Sebelas Maret University, Surakarta, Indonesia[1]
Email: mayyahsor@student.uns.ac.id [a], miftahwar@staff.uns.ac.id [b], faisal_r@staff.uns.ac.id [c]

Academic data plays a central role in supporting decision-making in educational institutions. However, the successful implementation of machine learning to analyze and make predictions based on academic data highly depends on the quality and readability of the data. To fully harness the potential of machine learning, careful preprocessing of academic data is essential. This research aims to design and implement preprocessing techniques, that is imputation, winsorizing, and dropping data on academic data. To handle missing values, the Multivariate Imputation by Chained Equation method is used with three different algorithms, linear regression, random forest, and KNN, and then the accuracy of these three algorithms in predicting missing values is compared. Additionally, winsorizing method is applied to outliers and data duplication is addressed by dropping duplicate data. Based on the testing results through evaluation metrics, these preprocessing techniques can improve model accuracy by 0.037 for MAE, 0.11 for RMSE, and 0.006 for MSE. The processed data allows the model to function more optimally and producemore reliable results.

Keyword: *Preprocessing, Machine Learning, MICE, Winsorizing, Evaluation Metrics*

PAPER ID: 061

Design of Automatic Transfer Switch System for Powerwall

Joko Slamet Saputro[1.a], D. Warindi[1.b], Miftahul Anwar[1.c], Agus Ramelan[1.d]

Department Electrical Engineering Universitas Sebelas Maret, Surakarta, Indonesia[1]
Email: jssaputro89@staff.uns.ac.id [a], warindi@staff.uns.ac.id [b], miftahwar@staff.uns.ac.id [c], agusramelan@staff.uns.ac.id [d]

Electrical energy is a primary need for humans as a support for everyday life. The importance of electrical energy has been realized by Tesla, who has launched a product called Powerwall. Powerwall is a battery pack that can be used as a backup supply when the power goes out. To support the use of a powerwall as a backup power source, a system is needed to replace the power source quickly and on time. For this reason, this paper describes an Automatic Transfer Switch design that is able to solve this problem. Besides being used to transfer resources, ATS also provides RS458 monitoring and communication facilities. The results show that ATS is able to move quickly and automatically with certain priorities. Monitoring and communication can also be done in the proposed system.

Keyword: *Automatic Transfer Switch, Powewall, change over, Power Monitoring*

PAPER ID: 062

Arduino-based Automatic Light System Simulation Using Proteus

Bhima Suci Dhamarsejati

Department of Electrical Engineering Universitas Sebelas Maret Surakarta, Indonesia
Email: dhamarsejati55@student.uns.ac.id

This research develops an incandescent lamp automation system using LDR sensors and Arduino microcontrollers to reduce energy waste due to negligence in turning off lights manually. The system is designed so that the lights turn on automatically when the sensor detects darkness. The methods used include circuit design and simulation with Proteus, as well as microcontroller programming with Arduino IDE. Tests show that the lights turn on when the sensor resistance value is below 300 and turn off when it is above 300, according to the detected light intensity. These results prove that the system works as expected and improves energy efficiency by ensuring lights are only on when needed. The automation is flexible and customizable for various environmental conditions, making it suitable for both home and workplace applications.

Keyword: *Arduino, Automatic Lamp, LDR, Proteus*

PAPER ID: 064

Computer Vision-based Brain Tumor Detection in MATLAB

Raffi Putra Prabowo

Department of Electrical Engineering Universitas Sebelas Maret Surakarta, Indonesia
Email: raffikeren@student.uns.ac.id

Diagnosis of diseases is an important step in the world of health. However, in practice, doctors often experience difficulties in the process of diagnosing diseases. This journal discusses a Computer Vision-based approach to detecting brain tumors using MATLAB software. The research method in this journal combines image segmentation techniques, feature extraction, and classification to identify areas of the brain affected by tumors from an image generated by an MRI machine.

Keyword: *Computer vision, MATLAB, brain tumor*

PAPER ID: 085

Robot Arm Controller Using Smartphone Based Arduino Microcontroller

Hanif Fadhil Abiyyu[1,a]

Electrical Engineering Dept. Sebelas Maret University
Surakarta, Indonesia[1]
Email: habiyyu23@student.uns.ac.id[a]

Remote controls are created to facilitate communication between devices with connecting devices. Communication tools that can be connected are android smartphone devices that communicate with other devices such as microcontrollers. One type of microcontroller is ATMega 16 which can be programmed using Bascom AVR language so it can control other devices to move the servo motor. Servo motor is integrated with the microcontroller in moving the media gate home. In doing this research using experimental method that is integrating android smartphone, microcontroller ATMega 16, and prototype gate home which connected with servo motor as main gate drive. From the research conducted to get the conclusion that the prototype has been successfully designed and inter-tool can communicate well so that the movement of the home gate is fully capable of being controlled by android smartphone.

Keyword: Microcontroller ATMega 16, Prototype, Remote Control

PAPER ID: 086

Cut-Off System as Voltage and Current Breaker for Battery Charging Based on Arduino Uno Microcontroller

Tio Ahmad Purnomoaji[1.a], Joko Hariyono[1.b]

Electrical Engineering Dept. Sebelas Maret University
Surakarta, Indonesia[1]
Email: tioahmad@student.uns.ac.id[a], jokohariyono@staff.uns.ac.id[b]

The charging process on the battery needs to pay attention to the current and voltage values flowing into the battery used. The charging time and battery life depend largely on the nature of the battery charger circuit. Inappropriate current and voltage can damage the accumulator and reduce the life of the accumulator. The problem can be solved by using a voltage and current cut-off circuit. The selection of a cut off circuit using relays and sensors controlled by an Arduino Uno microcontroller as a voltage and current cut-off device has the advantage of being able to cut off the voltage and current as limited without the need to replace components. Based on the test results using Proteus simulator, the cut off circuit can cut off the output voltage and current as specified to be given a limit. Based on the measurement results, the cut off circuit is able to cut off the voltage and current at a voltage of 13 V and a current of 0.3 A on a 1.2 Ah battery. This circuit is also able to cut off the voltage and current when in the over temperature threshold that is about 45oC.

Keyword: Arduino Uno, Battery Charging, Cut-Off, Sensor.

PAPER ID: 087

Large Language and Vision Models to Assist Drone Forensic Analysis

Arda Surya Editya[1.a], Tohari Ahmad[1.b], Hudan Studiawan[1.c]

Departement of Informatics Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia[1]
Email: 7025211019@student.its.ac.id [a], tohari@its.ac.id [b], hudan@its.ac.id [c], mberaun@continental.edu.pe [d]

Drones have become an important technology with extensive industrial processes. However, operational accidents can happen, so we need a way to figure out what caused them with drone forensics. An important part of drone forensics is the analysis phase, where investigators examine data to determine the cause of the accident. In this paper, we explore the implementation of Large Language Models (LLMs) with vision capabilities to enhance the forensic analysis of drone incidents. Our experiment involved the use of various LLMs, including ChatGPT, Google Gemini, and LLaVA. The results indicate that the use of LLMs in drone forensic analysis has significant potential. Among the models tested, Google Gemini demonstrated the best performance, achieving a higher BLEU score than the other models.

Keyword: ChatGPT, Drone Forensics, LLMs, LLaVA, Google Gemini

PAPER ID: 088

Automation and Improvement of the Artisan Yoghurt Packaging Process: A Simulation-Based Approach

José Gregory Huanca-Alvino[1.a], Shamir Efrain Salomon-Pazce[1.b], Max Anderson Inga-Gómez[1.c], Manuel Michael Beraún-Espíritu[1.d]

School of Mechatronics Engineering Universidad Continental[1]
Email: 72508307@continental.edu.pe[a], 73671592@continental.edu.pe[b], 75624198@continental.edu.pe[c], mberaun@continental.edu.pe[d]

This paper addresses the automation of the filling and packaging process of artisanal yoghurt in the Junín region of Peru, with the aim of improving efficiency and reducing costs in response to increasing competition in the local dairy industry. Using SolidWorks for 3D modelling and simulations, together with CADeSimu and PCSimu for electrical design, a prototype was developed that automates the filling, capping and curling functions using capacitive sensors, solenoid valves and a PLC controller. Simulation results show a significant improvement in process efficiency, with a reduction in errors compared to manual methods, ensuring accurate and consistent dosing resulting in a high-quality product and increased production capacity. In conclusion, the implementation of this automated system in the production of artisanal yoghurt is feasible and offers important advantages in terms of productivity, cost reduction and product quality improvement, representing a significant advance towards the modernization of yoghurt production in the region.

Keyword: Automation, CADeSimu, Filling, Sealing, Yogurt Production, PLC, SolidWorks, PCSimu.

PAPER ID: 089

Design And Mechanical Simulation of A Solar Photovoltaic Fish Storage Cold Storage Chamber Using VDI 2221 Methodology

Brolim Yazzar Quispe-Palpa[1.a], José Daniel Siccha-Franco[1.b], Fredy Miguel Capcha-Ospina[1.c], Manuel Michael Beraún-Espíritu[1.d]

School of Mechatronics Engineering Universidad Continental[1]
Email: 73123595@continental.edu.pe[a], 61593882@continental.edu.pe[b], 42154904@continental.edu.pe[c], mberaun@continental.edu.pe[d]

The fishing industry faces significant challenges in the preservation and transport of fresh fish due to its highly perishable nature. Optimal storage conditions are crucial to ensure product quality and prevent economic losses. Conventional storage systems, although effective, rely on non-renewable energy sources, which increases operating costs and environmental impact. In response, the integration of refrigeration systems using solar photovoltaic energy emerges as a promising alternative, decreasing dependence on fossil fuels and reducing greenhouse gas emissions. This study adopts the VDI 2221 methodology, a German standard for product design and development, to address the design of a solar photovoltaic refrigeration chamber for fish storage. This methodology provides a structured framework that facilitates the identification and evaluation of optimal solutions, ensuring a methodological and precise approach at each stage of project development. Three alternative solutions were designed and evaluated using morphological matrices and detailed mechanical simulations. The optimal solution identified includes components such as polycrystalline photovoltaic panels and a gel battery system for solar energy collection and storage. The results of the simulations show a uniform temperature distribution and efficient performance of the cooling system, reaching temperatures down to -22.81 °C. The study concludes that the implementation of solar PV-powered refrigeration systems can transform the fishing industry, promoting the reduction of energy consumption and carbon emissions, aligning with global sustainability goals and improving food safety and storage conditions.

Keyword: Fish Preservation, Optimal Storage Conditions, Solar Powered, VDI 2221.

PAPER ID: 090

Impact of Electromagnetic Stimulation on the Sustainable Germination of Raphanus Sativus Seed: A Multidisciplinary Approach

Manuel Michael Beraún-Espíritu[1.a], Ketty Marilú Moscoso-Paucarchuco[2.b], Luis Antonio Visurraga-Camargo[2.c], Wilfredo Fredy Paco-Huamani[3.d], Shalin Carhuallanqui-Avila[3.e], Joaquin-Machaca Rejas[4.f]

School of Mechatronics Engineering Universidad Continental[1]
Universidad Nacional Autonoma Altoandina de Tarma[2]
Universidad Nacional del Centro del Perú[3]
Universidad Nacional José Maria Arguedas[4]
Email: mberaun@continental.edu.pe[a], kmoscoso@unaat.edu.pe[b], lvisurraga@unaat.edu.pe[c], wilfredo.paco@unh.edu.pe[d], scarhuallanqui@uncp.edu.pe[e], jmachaca@unajma.edu.pe[f]

The project focuses on addressing the challenges in the seed germination process, exploring environmentally friendly solutions based on physical and biological treatments. It focuses specifically on the germination of seeds of Raphanus sativus (rabbit) and analyses the impact of electromagnetic stimulation on this process, considering the use of technologies based on magnetic fields and ultraviolet light spectres. The paper presents a multidisciplinary approach that integrates mechatronics as a methodological basis, using the VDI 2206 model as a practical guide and rapid prototyping technology for development. The analysis includes aspects of electrical, mechanical and electronic design, describing a structure of functions that includes control domains, electric, electronic and energy systems. The morphological matrix generator tool is used to detail key aspects of the design, based on the concept of n-dimensional morphology boxes. A detailed design of the seed structure and control structure is presented, as well as the selection of electrical components for the system. The project highlights the importance of sustainability and environmental protection in exploring innovative solutions for seed germination. The article concludes with the presentation of a general plan in 2D for the printing of the plate, essential in the practical materialization of the design. Finally, the complete assembly of the components is displayed, both physically and in a digital simulation in the Tinkercad program, providing a detailed and comprehensive view of the developed system. This study aims to contribute significantly to the knowledge and application of sustainable techniques in agriculture, in the process of germination of seeds of Raphanus sativus.

Keyword: electromagnetic stimulation, Magnetic fields, Mechatronics, Seed germination, VDI 2206.

PAPER ID: 091

Automated Hydroponic Irrigation System: Innovation and Efficiency in Lettuce Cultivation

Manuel Michael Beraún-Espíritu[1.a], Ketty Marilú Moscoso-Paucarchuco[2.b], Luis Antonio Visurraga-Camargo[2.c], Wilfredo Fredy Paco-Huamani[3.d], Edson Hilmer Julca -Marcelo[4.e], Joaquin-Machaca Rejas[5.f]

School of Mechatronics Engineering Universidad Continental[1]
Universidad Nacional Autonoma Altoandina de Tarma[2]
Universidad Nacional de Huancavelica[3]
Universidad Nacional del Centro del Perú[4]
Universidad Nacional José Maria Arguedas[5]
Email: mberaun@continental.edu.pe[a], kmoscoso@unaat.edu.pe[b], lvisurraga@unaat.edu.pe[c], wilfredo.paco@unh.edu.pe[d], scarhuallanqui@uncp.edu.pe[e], jmachaca@unajma.edu.pe[f]

Irrigation is an essential activity in agriculture, and its efficient management is crucial for the healthy development of plants, especially in hydroponic systems. This paper presents the design and development of an automated hydroponic irrigation system optimised for lettuce cultivation, using advanced technologies such as sensors and control systems based on a black box simulation model. The system allows precise water and nutrient management, ensuring ideal conditions for plant growth. The methodology applied in the design of the system is based on the VDI 2221 standard, which provides a systematic approach to the identification and resolution of engineering problems. Tools such as the morphological matrix and functional diagrams were used to optimise the functionality and efficiency of the design. The results show that the automated system offers superior control of water and nutrient distribution, contributing to a more sustainable and productive growing environment. The system includes a charge controller to prevent battery overcharging, an on/off circuit for the submersible motor pump, and a DC-DC converter to power the Arduino board, all of which are integrated to ensure automated and efficient operation. In addition, the mechanical design has been optimised to facilitate maintenance and ensure the durability of the system. This work contributes to the advancement of hydroponic agriculture by offering a technological solution that improves irrigation efficiency and promotes sustainability in agricultural production.

Keyword: Automated system, Cultivaton, Hydroponic irrigation, VDI 2221

PAPER ID: 092

Design of a PLC-Controlled Sheet Metal Folding Machine

Cesar Javier Girón-Martinez[1.a], Cristian Luis López-Torres[1.b], Villalva Huari-Wilder[1.c], Manuel Michael Beraún-Espíritu[1.d], Albert Justiniano-Medina[1.e]

School of Mechatronics Engineering Universidad Continental[1]
Email: 73381159@continental.edu.pe[a], 70867382@continental.edu.pe[b], 70605061@continental.edu.pe[c], mberaun@continental.edu.pe[d], 73141231@continental.edu.pe[e]

This literature study exmines the factors influencing the adoption of electricity-based technologies from an emotional perspective. Emotions are essential in human life, influencing daily decision-making, social interactions, and mental health. Various theories and classifications of emotions are discussed, highlighting the complexity of emotional responses and their impact on consumer behavior. Using a systematic literature review (SLR) metodhology, this study synthesized findings from relevant research published between 2014 and 2024 in various database, including Scopus, ScienceDirect, and others. The results underscore the critical role of emotional, cognitive, and normative factors in shaping consumers' intention to adopt new technologies. This analysis provides insights into the psychological and emotional factors influencing the decision-making for adopting a tchnology. Emotional factors influence the adoption of electricity-based technologies, providing valuable information for product designers and marketers to foster poritive emotional reactions and encourage the adoption of electricity-based technologies.

Keyword: Adoption Technology, Electrical Tools, Emotional Perspective Positive Emotional, Perspective

PAPER ID: 094

Adoption Of Electrical Tools from an Emotional Consumer Perspective: A Literature Study

Safira Maharani Redhayndaputri[1.a], Retno Wulan Damayanti[1.b], Renny Rochani[1.c]

Industrial Engineering Department, Faculty of Engineering, Sebelas Maret University[1]
Email: safiramredhyndaputri@student.uns.ac.id[a], rwd@ft.uns.ac.id[b], rennyrochani@staff.uns.ac.id[c]

This literature study exmines the factors influencing the adoption of electricity-based technologies from an emotional perspective. Emotions are essential in human life, influencing daily decision-making, social interactions, and mental health. Various theories and classifications of emotions are discussed, highlighting the complexity of emotional responses and their impact on consumer behavior. Using a systematic literature review (SLR) metodhology, this study synthesized findings from relevant research published between 2014 and 2024 in various database, including Scopus, ScienceDirect, and others. The results underscore the critical role of emotional, cognitive, and normative factors in shaping consumers' intention to adopt new technologies. This analysis provides insights into the psychological and emotional factors influencing the decision-making for adopting a tchnology. Emotional factors influence the adoption of electricity-based technologies, providing valuable information for product designers and marketers to foster poritive emotional reactions and encourage the adoption of electricity-based technologies.

Keyword: Adoption Technology, Electrical Tools, Emotional Perspective Positive Emotional, Perspective

PAPER ID: 095

Literature Review Technoware and Humanware Readiness for Electrical Technology Adoption: Initiating Study for Induction Stove Adoption In Indonesia

Hasna Wahidaturrasyidah Anshori[1.a], Retno Wulan Damayanti[1.b], Eko Pujiyanto[1.c]

Industrial Engineering Sebelas Maret University[1]
Email: hasnawahidatur@student.uns.ac.id [a], rwd@ft.uns.ac.id[b], ekopujiyanto@staff.uns.ac.id [c]

This research explores technological and human readiness to adopt electrical technology through a comprehensive literature review from 2019 to 2024. Research findings emphasize the importance of factors such as human preferences, habits, knowledge, and skills in the adoption and implementation of electricity-based technologies. This research emphasizes the potential of electric technology as a clean, efficient, and sustainable solution compared to other power sources. Additionally, this research also addresses challenges such as unstable electricity infrastructure and limited access to electricity in some regions, which hinder the widespread adoption of electric technologies. This research emphasizes the importance of the elements technoware and humanware determining the effectiveness of the use of electrical technology, emphasizing the need for reliable electrical infrastructure and user knowledge and skills. Key challenges include the need for adequate electricity infrastructure in remote areas and a lack of public understanding and awareness of this technology. This study highlights the importance of improving electricity infrastructure to ensure a stable and equitable electricity supply, as well as the need for ongoing education programs to increase public knowledge and acceptance of induction cookers. Overall, this research highlights the importance of the role of technology and humans in adopting electrical technology, both in terms of knowledge, consumer awareness, and environmental awareness in influencing the technology adoption transition.

Keyword: Cooking Technology, Electricity, Electrical Technology**,** Humanware, Technoware, Technology Adoption

PAPER ID: 097

Dryness Level Measurement of Coconut Shell Charcoal Briquettes Using Plate-Shaped Electrodes

Shivendra Singh[1.a], Ram Vaishnav[1.b], Pooja Goswami[1.c]

Central research Laboratory Bharat Electronics Limited[1]
Email: shivendra.singh@bel.co.in[a], ramvaishnav@bel.co.in[b], poojagoswami@bel.co.in[c]

Briquette dryness level is a benchmark for coconut shell charcoal briquette quality. In this study, the measurement of briquette dryness was studied by measuring the resistance of the briquette using plates attached to the sides of the briquette. Performance of copper plate electrodes was compared with performance of electrodes made of PCB pieces. Briquette dryness is divided into 3 groups. They are wet, half-dry, and dry. From the measurement results, it was obtained that the measurement of briquette resistance with PCB plate electrodes was more stable than copper plate electrodes measurement. Briquettes are declared dry if they have a high resistance or low conductivity.

Keyword: Briquette, Charcoal, Dryness, Electrode, Plate

PAPER ID: 098

Evaluating Area Coverage Efficiency in Swarm Robotics: A Comparative Study of Different Approaches

Shivendra Singh[1.a], Ram Vaishnav[1.b], Pooja Goswami[1.c]

Central research Laboratory Bharat Electronics Limited[1]
Email: shivendra.singh@bel.co.in[a], ramvaishnav@bel.co.in[b], poojagoswami@bel.co.in[c]

Swarm robotics is an emerging field inspired by natural systems like insect colonies, focusing on decentralized, scalable, and robust multi-robot coordination. This paper presents a comparative study of four key area traversal algorithms used in swarm robotics: Random Walk, Flocking, Behavior-Based, and Spiral Search. These algorithms are evaluated on several quantitative parameters, including best position, coverage area, final velocity magnitude, trajectory efficiency, and convergence speed. Random Walk offers high coverage but suffers from inefficiency due to its unpredictable nature. Flocking provides cohesive group movement but is slower to converge. Behavior-Based algorithms balance avoidance and exploration but require fine-tuning for optimal performance. Spiral Search enables systematic exploration with moderate coverage and convergence. The results show that no single algorithm excels in all areas, emphasizing the need for task-specific algorithm selection. Future research should explore hybrid approaches, scalability, and real-world testing to enhance algorithm robustness and adaptability in dynamic environments.

Keyword: Area Traversal Algorithms, Behavior-Based Algorithm, Coverage Efficiency, Decentralized Control, Flocking, Multi-Robot Coordination, Swarm Robotics, Random Walk, Spiral Search, Trajectory Efficiency, Scalability, Robustness.

PAPER ID: 099

A Comprehensive Review on LiDAR Based 3D Deep learning Object Detection Algorithms

Pooja Goswami[1.a], Ram Vaishnav[1.b] Tanishq Anand[1.c], Prateek Dayal[1.d],

Central research Laboratory Bharat Electronics Limited[1]
Email: poojagoswami@bel.co.in[a], ramvaishnav@bel.co.in[b], tanishqanand@bel.co.in[c], prateekdayal@bel.co.in[d]

Recent advancements in autonomous vehicles and robotics have underscored the importance of robust 3D object detection(3DOD) systems. Among various sensor modalities, 3D LiDAR stands out for its ability to provide dense and accurate point cloud data(cloud of points signifying the reflected rays from the surface of objects present in the environment of the sensor), crucial for detecting and localizing objects in 3D space. This paper surveys the state-of-the-art (SOTA) deep learning models specifically tailored for 3D object detection for 3D LiDAR data. We classify these models based on their foundational architectural principles and methodologies,including voxel-based, point-based, and range-image-based techniques. Popular Key datasets, evaluation metrics and considerations for real-time application are discussed, highlighting advancements and ongoing challenges in the field. Finally,this review seeks to guide future research towards enhancing the accuracy, speed and robustness of 3D object detection systems utilizing 3D LiDAR technology.

Keyword: 3D Object Detection, LiDAR, Pointcloud, Deep Learning

PAPER ID: 100

Improvement of Uncertainty Evaluation on Impact Testing Machine by Implementation of Computer Vision

Hafid[1.a], Muhammad Tauviqirrahman[2.b] Rusnaldy[2.c], Rudi Anggoro Samodro[1.d], Teguh Muttaqie[1.e], Adindra Vickar Ega[1.f], Gigin Ginanjar[1.g], Yonan Prihhapso[1.h], Dinar Nurcahyono[1.i], Bernadus Hedi Sirenden[1.j]

Research Center for Testing Technology and Standard National Research and Innovation Agency[1]
Department of Mechanical Engineering, Faculty of Engineering Diponegoro University Semarang, Indonesia[2]
Email : hafi007@brin.go.id[a], mohammad.tauviqirrahman@ft.undip.ac.id[b], rusnaldy@lecturer.undip.ac.id[c], rrud001@brin.go.id[d], teguh.muttaqie@brin.go.id[e], adin009@brin.go.id[f], gigi002@brin.go.id[g], yona001@brin.go.id[h], dina018@brin.go.id[i], bern002@brin.go.id[j]

The previous research on uncertainty evaluation of an impact testing machine has been enhanced through the implementation of computer vision. Data collection involves using cameras to record the analog indicators on the impact testing machine during operation. The indicator readings are taken using computer vision, which predicts the position of the pendulum arm's angle. By using computer vision, the resolution of the indicator has been improved compared to manual readings. In cases where resolution is the dominant source of uncertainty, this study shows that the manual reading resolution of 0.2° can be improved to 0.07° using computer vision. Consequently, the estimated relative uncertainty of absorbed energy can potentially be reduced from 0.88% to 0.36%. These findings highlight the significant role of Artificial Intelligence in improving the evaluation of uncertainty in impact testing results.

Keyword: Artificial Intelligence, Computer Vision, Impact Testing Machine Indicators, Impact Testing, Digitization of Analog Indicators

PAPER ID: 101

Advancements in Composite Materials for Energy-Efficient Ship Design: A Review of Material Performance and Failure Analysis

Cresia Rotua Simanjuntak[1.a], Teguh Muttaqie[2.b], Tuswan Tuswan[1.c], Hartono Yudo[1.d], Alfiy Alfatarizqi[3.e], Imam Pujo Mulyatno[1.f], Andi Trimulyono[1.g]

Department of Naval Architecture, Diponegoro University Semarang, Indonesia[1]
Research Centre for Testing Technology and Standard National Research and Innovation Agency[2]
Department of Marine Engineering, Faculty of Marine Technology, Institut Teknologi Sepuluh Nopember Surabaya, Indonesia[3]
Email : cresiasmnjtk@students.undip.ac.id[a], tegu019@brin.go.id [b], tuswan@lecturer.undip.ac.id[c], hartono.yudo@yahoo.com[d], alfiyalfatarizqi.research@gmail.com[e], pujomulyatno2@gmail.com[f], anditrimulyono@gmail.com[g]

The growing demand for increased energy efficiency and reduced greenhouse gas emissions has driven significant interest to optimize the use of composite materials in ship construction. This research aims to review the current literature on the performance and failure prediction of composite materials in marine applications. Through a comprehensive analysis of 100 peer-reviewed papers, this study identifies trends in applying neural networks and other advanced algorithms for predicting material performance and common failure mechanisms. The findings are expected to enhance the development of more efficient and sustainable ship designs and provide data-driven strategies for mitigating risks associated with composite material failures in marine environments.

Keyword: Composite Material, Ship Design, Energy Efficiency, Material Performance, Failure Analysis

PAPER ID: 102

License Plate Recognition Using YOLOv8 and CNN

Sakda Thongcai[1.a], Joko Hariyono[2.b], Pringgo Widyo Laksono[3.c], Andhy Setiyo Nugroho[4.d], Joko Slamet Saputro[2.e], Wahyono[5.f]

Mechanical Engineering Dept. Sriracha Kasitsa University Thailand[1]
Electrical Engineering Dept. Sebelas Maret University Surakarta, Indonesia[2]
Industrial Engineering Dept. Sebelas Maret University Surakarta, Indonesia[3]
Indonesia Satu Tujuh. Jakarta, Indonesia[4]
Dept. of Computer Science and Electronics Universitas Gadjah Mada Yogyakarta, Indonesia[5]
Email : Sakda.eng@eng.src.ku.ac.th[a], jokohariyono@staff.uns.ac.id [b], pringgowidyo@staff.uns.ac.id[c], andhysn@ina17.com[d], jssaputro89@staff.uns.ac.id[e], wahyo@ugm.ac.id[f]

The research carried out is the development of a vehicle license plate detection and recognition system. The research objective is to produce an adequate detection and recognition system model for vehicle license plates with a black background or white background according to the policy in August 2022. The research used YOLOv8 algorithm to detect vehicle license plates because of its reliability in detecting objects using IoU. Meanwhile, for character recognition, CNN algorithm was used because of its ability to perform OCR. YOLOv8 training results with 857 images resulted in 94.37% accuracy, 98% precision, 90% recall, 94% F1 score, and 75.01% average IoU. When testing CNN, obtained an accuracy of 87.142%, a recall of 87.5%, a precision of 98.245%, and F1 score of 92.561%. While CNN training with 17,774 images, resulted in an accuracy of 99.82% training data and 98.79% validation data. For character recognition test, the average success rates of character recognition on each black plate was 92.975% and 96.814% white, while for plate recognition success for plates with a black background was 60% and 80% white.

Keyword: CNN, OCR, YOLO

PAPER ID: 103

Simulating of Geofencing Technology Using Flutter Framework for Employee Attendance System in SMEs

Muhammad Nabil Faris[1.a], Reyhan Aulia Faried[1.b], Welbert Partogi Victory[1.c], Sarwo[1.d]

Computer Science, BINUS Online Learning, Bina Nusantara University, Jakarta, Indonesia[1]
Email : muhammad.faris@binus.ac.id[a], reyhanaf@binus.ac.id [b], wellbert.victory@binus.ac.id[c], sarwo@binus.ac.id[d]

The COVID-19 pandemic from 2019 to 2022 has profoundly affected global economies, particularly impacting Small and Medium Enterprises (SMEs), which are crucial for economic stability. This paper presents a solution to enhance employee attendance management in SMEs through the implementation of a geofencing-based system using the Flutter framework. The transition from traditional manual attendance methods, which are prone to inaccuracies and fraud, to a digital solution is essential for SMEs, especially in developing countries like Indonesia, where unemployment has surged due to the pandemic. The proposed application leverages geofencing technology to ensure accurate location verification of employees during attendance, thereby improving the reliability of attendance records. The development process utilized Flutter, an open-source framework that supports cross-platform applications, allowing for easy deployment on various devices. Evaluation results indicate that the application effectively addresses common issues associated with manual attendance systems, such as fraud and inaccuracies, while providing transparent reporting capabilities. Key findings include a user-friendly interface, the effectiveness of geofencing in ensuring accurate employee locations, and a streamlined attendance recap process that allows for easy data management. This research contributes to the ongoing discourse on leveraging technology for operational efficiency in SMEs, particularly in the post-pandemic recovery phase, and suggests future enhancements for broader platform compatibility and additional features to improve user experience.

Keyword: Android, Attendance, Flutter, Geofence, SME

PAPER ID: 104

Design of Weighbridge Plant Application for Operational Efficiency at PT. Pelindo Energi Logistik Surabaya

Yusuf Faisol Mubarok[1.a], Sarwo[1.b]

Computer Science, BINUS Online Learning, Bina Nusantara University, Jakarta, Indonesia[1]
Email: yusuf.mubarok@binus.ac.id[a], sarwo@binus.ac.id[b]

PT Pelindo Energi Logistik Surabaya is a company that plays a crucial role in the logistics and energy sectors, particularly in handling and managing goods at ports. Efficiency and accuracy in managing the weighing plant are vital for the smooth distribution of goods, especially for those with large volumes. However, the company currently relies on a manual system for managing the weighing process, which is time-consuming and prone to human error. Mistakes in recording and weighing data can lead to inaccuracies that negatively impact operational efficiency and the quality of decision-making. Furthermore, the manual system makes it difficult to monitor and control the weighing process effectively. To address these issues, a more reliable automated solution is needed. This research proposes the design and implementation of a Human-Machine Interface (HMI) application integrated with a database as an alternative to the manual system. The HMI application aims to simplify the interaction between operators and machines, providing a faster and more accurate method for managing weighing data. Implementing a database will ensure structured data storage and better accessibility, allowing for real-time data processing and analysis. This solution will enhance productivity, reduce errors, and facilitate more effective decision-making at PT Pelindo Energi Logistik Surabaya.

Keyword: Automation, Energi Logistik Surabaya, Human-Machine Interface, Weighing Plant Management, Operational Efficiency, PT Pelindo

PAPER ID: 105

Implementation of L2 Inter Autonomous System Service with Seamless MPLS on Nokia 7750 SR Metro Ethernet Device

Rizki Dzulfiqor Mu'taz[1.a], Sarwo[1.b]

Computer Science, BINUS Online Learning, Bina Nusantara University, Jakarta, Indonesia[1]
Email: rizki.mutaz@binus.ac.id[a], sarwo@binus.ac.id[b]

The rapid development of information and communication technology has increased the need for more reliable and faster internet. As one of the leading technologies, Metro Ethernet uses devices such as the Nokia 7750 SR router to improve the quality of internet service providers (ISP) services. This study aims to implement layer 2 services between domains or Autonomous Systems (AS) with the seamless Multiprotocol Label Switching (MPLS) method on the Nokia 7750 SR Metro Ethernet device. Seamless MPLS is a service that expands direct interconnections between geographically separated local networks and can be used to form large-scale networks that can be used to build all types of services on the end-to-end MPLS LSP hierarchy. Seamless MPLS allows seamless expansion of MPLS networks between domains, improving performance with smaller routing tables and better delays. This study involves the design and configuration of an Inter-AS network using GNS3, where layer 2 connectivity between ASs is implemented via eBGP for interdomain tunneling. Redundancy topology is also used as a backup mechanism. Testing is done by analyzing network performance in terms of throughput and delay using Wireshark. The study results show an increase in network performance with more stable throughput and lower delay through seamless MPLS, as well as the effectiveness of redundancy in maintaining connectivity when a link failure occurs. This study provides a practical solution for layer 2 connectivity between AS with more optimal performance through seamless MPLS technology.

Keyword: Autonomous System, MPLS, Nokia, Service Router

PAPER ID: 106

Recurrent Neural Network from Multimodal Spectogram and Embedding of Indonesian Music Mood Audio

Thoyyibah. T[1.a]

Information System Management

Department, BINUS Graduate Program-Master of Information System Management
University of Bina Nusantara, Jakarta, Indonesia, 11480[1]
Email: thoyyibah.t@binus.ac.id[a]

This study uses Recurrent Neural Network (RNN) in the form of Gated Recurrent Unit (GRU) and uses an algorithm in the form of adam optimizer for the classification of Indonesian music moods with various genres. GRU is used to simplify the RNN architecture. GRU is used to reduce computational complexity by maintaining memory in long sequences. Adam Optimizer is used for the model training process which can also be used to improve optimization performance. This study uses a self-made Indonesian song dataset. The features used in this study use the spectrogram feature for the audio feature with word embedding for the text feature. The dataset used uses 3 labels, namely sad, happy and neutral. The multimodal accuracy result is 49% accuracy.

Keyword: Gated Recurrent Unit (GRU), Music Indonesia, Spectogram

PAPER ID: 107

Enhancing Financial Institution X's ATM Operations through Service-Oriented Modeling Architecture (SOMA): A Case Study

Ayar Fauzan Romzie[1.a], Gunawan Wang[1.b]

Information System Management Departement, BINUS Graduate Program – Master of Information System Management, Bina Nusantara University, Jakarta 11480, Indonesia[1]

This research aims to analyse the ATM Module business process mapping at Institution X using the Service-Oriented Modeling Architecture (SOMA) approach. A descriptive qualitative approach with a case study method was employed, involving data collection through interviews with Business Analysts and SOA Analysts at Institution X. These participants possess a background in core banking and payment system management. The study reveals that the SOMA approach effectively addresses the complexity of existing banking systems by enabling detailed mapping and design. This approach not only enhances the internal efficiency of the ATM Module but also facilitates the seamless integration of various disparate payment channels, including BI-FAST, ERP, FOMOBO, and E-BANKING, with the Core Banking System (CBS). As a result, a fully integrated system is achieved, enabling faster, more secure, and readily accessible cross-platform transaction management. The findings highlight the significant benefits of adopting SOMA in financial institutions, such as improved interoperability and streamlined operations, while also acknowledging the challenges and offering recommendations for successful implementation. This study contributes to the understanding of how service-oriented architectures can be leveraged to optimize financial processes and provides actionable insights for practitioners seeking to enhance their institution's technological framework.

Keyword: Enterprise Architecture, Business Process Mapping, SOMA Framework, Service-Oriented Applications, Interoperability, Core Banking Integration

PAPER ID: 108

A Literature Review: Bearing Fault in BLDC Motor Based on Vibration and Thermal Signals

Meiyanto Eko Sulistyo[1.2.a], Didik Djoko Susilo[1.b], Muhammad Nizam[2.c], Ubaidillah[1.d]

Department of Mechanical Engineering, Universitas Sebelas Maret, Surakarta, Indonesia[1]
2Department of Electrical Engineering, Universitas Sebelas Maret, Surakarta, Indonesia[2]
Email: mekosulistyo@staff.uns.ac.id[a], djoksus@staff.uns.ac.id[b], muhammad.nizam@staff.uns.ac.id[c], ubaidillah_ft@staff.uns.ac.id[d]

This review of the literature looks into the use of vibration and thermal signals for the diagnosis and detection of bearing problems in brushless DC (BLDC) motors. The study highlights the efficacy of current developments in diagnostic algorithms and signal processing approaches in detecting bearing irregularities. The comparative study of vibration and heat monitoring techniques is highlighted, along with a discussion of each method's benefits and drawbacks. The integration of various methods for improved fault detection accuracy is also examined in the paper. The results indicate that a hybrid strategy that combines temperature analysis and vibration provides a reliable way to identify BLDC motor problems early on, which could enhance maintenance plans and operational dependability.

Keyword: Bearing Fault Detection, BLDC Motor, Vibration Analysis, Thermal Monitoring, Signal Processing Techniques

PAPER ID: 109

Determining Key Success Factor on Strategy Implementation of Supply Chain Management Applications Using the Factor Analysis Method

Beatrice Arviani[1.a], Wahyu Sardjono[1.b], Astari Retnowardhani[1.c]

Information Systems Management Department, BINUS Graduate Program – Master of Information Systems Management, Bina Nusantara University, Jakarta, Indonesia 11480[1]

Email: beatrice.arviani@binus.ac.id[a], wahyu.s@binus.ac.id[b], astari.retnowardhani@binus.ac.id[c]

The main purpose of this study is to identify factors and indicators that contributed to influencing the effectiveness of the supply chain management process in PT. XYZ. These factors and indicators have been found through factor analysis and regression analysis methods based on the questionnaire data obtained from the company's employees. Four new factors were found in this study including techno-operational framework, customer experiential quality, partnership synergy, and customer value exchange. Furthermore, the present study also attempts to provide strategy recommendations in each factor for the company to cope with the existing problems. These recommendations give the company an opportunity to optimize its supply chain management effectiveness, thus the company's performance and competitive advantage in the market can be improved.

Keyword: Supply Chain Management, Proforma Invoice, Factor Analysis Method, Regression Analysis Model, Corporate

PAPER ID: 109

Initial Study on Tourism Promotion Productivity through Collaborative Digital Promotion Using Multi-Application Enterprise Service Bus Software

Wisnu Adi Saputro[1.a], Ditdit Nugeraha Utama[2.b], Haryono Soeparno[1.c], Widodo Budiharto[3.d]

Binus Graduate Program, Doctor of Computer Science, Bina Nusantara University, Jakarta, Indonesia[1]
Computer Science Department, Binus Graduate Program, Master of Computer Science, Bina Nusantara University, Jakarta, Indonesia 11480[2]
Computer Science Department, School of Computer Science, Bina Nusantara University, Jakarta, Indonesia[3]
Email: wisnu.saputro@binus.ac.id[a]

Digital promotion has been conducted by business actors in the tourism sector through various online platforms, including websites, social media platforms such as Facebook, Instagram, WhatsApp (WA), blogs, and email. Nevertheless, these promotional activities are carried out separately, failing to capitalize on the opportunity to optimize the dissemination of information on tourism products and services to tourists and ensure standardization across the board. The tourism business websites in question provide information on tourist products in isolation, with unknown URLs, presenting the same tourist product data inconsistently and not always up to date. The objective of this research is to construct an initial model of a digital promotion collaboration application to increase the productivity of tourism sector promotion. The methodology employed is that of the six-step Design Science Research Methodology (DSRM) as set forth by Peffers et al. (2007), namely identify problems and motivate, define objectives of a solution, artifact's design and development, demonstration, evaluation, and communication applied to the tourism business. The construction of the model employed the use of Enterprise Service Bus (ESB) multi-application mediator software. This research concludes that digital collaboration for tourism promotion in Indonesia is feasible, given the special characteristics of tourism businesses and the large number of businesses that have web and other digital media.

Keyword: Tourism Promotion, Digital Collaboration, Productivity, Enterprise Service Bus

PAPER ID: 111

Evaluation of IT Governance Using the COBIT 5 Framework (Case Study: Gelora Bung Karno Complex Management Center)

Viko Herdiva Saksono[1.a], Gunawan Wang[1.b]

Information System Management Department, BINUS Graduate Program – Master of Information System Management, Bina Nusantara University, Jakarta, Indonesia[1] 11480

The Gelora Bung Karno Complex Management Centre (PPKGBK), under the Ministry of the State Secretariat of Indonesia, faces IT challenges that hinder its business strategy. These include system vulnerabilities, lack of integration, unresolved customer complaints, and insufficient IT staff training. To address this, an IT preparedness assessment was conducted using the COBIT 5 framework, covering domains such as EDM01, APO01, and DSS01, among others. The evaluation yielded a capacity rating of 2.88 at level 3 (established), with 57.67% categorized as "Largely Achieved." However, areas like "APO07-Manage Human Resources" and "EDM01-Ensure Governance Framework Setting and Maintenance" showed below-average performance, needing improvement. The recommended improvements aim to enhance PPKGBK's capacity to levels 4 (managed) and 5 (optimized), ensuring better information security management, improved coordination, and operational efficiency aligned with business strategies.

Keyword: Audit, Information Technology Governance, COBIT 5, Capability Level.

PAPER ID: 112

Initial Exploring Key Drivers of Employee Comprehension in Utilizing the Knowledge Management Portal at State-owned Construction Software

Antonius Eko Indriarto[1.a], Wahyu Sardjono[1.b]

Information System Management Department BINUS Graduate Program – Master of Information System Management Bina Nusantara University Jakarta, Indonesia 11480[1]

Email: antonius.indriarto@binus.ac.id[a], wahyu@binus.ac.id[b]

In the digital era, the effectiveness of a Knowledge Management (KM) Portal within an organization is pivotal for enhancing operational efficiency and competitiveness. This study aims to identify and analyze the factors that improve employee understanding of the KM Portal at a leading state-owned construction firm in Indonesia. Through a comprehensive survey and Exploratory Factor Analysis (EFA), this research identified four critical factors: KMEnablement, KMGamification, SmartDissemination, and DisseminationMix. These factors significantly influence how employees utilize the KM Portal. By leveraging these factors, the company can enhance the portal's usage, thereby improving operational outcomes and fostering innovation.

Keyword: Knowledge Management, KM Portal, Employee Understanding, Gamification, Exploratory Factor Analysis (EFA)

PAPER ID: 113

Enhancing Credit Distribution through Machine Learning: A Classification Approach for Customer Eligibility in XYZ Bank

Tuga Mauritsius[1.a], Edward Adi[1.b], Aldridge Yodiea[1.c], Freddy Mazmur[1.d]

Master of Information Systems Management Binus University[1]

In banking, the primary objective for most institutions is to expand loan distribution, as the profits generated from these loans represent a significant asset. However, lending also involves considerable risk. To mitigate potential risks, banks meticulously evaluate the personal information of prospective borrowers before granting loans. The decision to approve or deny a loan is critical, as it directly influences the probability of credit defaults, making the selection of suitable customers a crucial process. This study aims to classify eligible customers of XYZ Bank for loans by examining factors such as age, average monthly credit card usage, education level, professional experience, family size, and income. The research employs machine learning techniques through data mining classification methods, including Decision Tree, Random Forest, Naïve Bayes, and Neural Network algorithms, using RapidMiner for analysis. The models' performance is validated through a confusion matrix. The findings indicate that the Random Forest algorithm achieved the highest classification accuracy, with an accuracy rate of 99.07%, precision of 98.49%, and recall of 96.07%.

Keyword: Bank, Loans, Data Mining, Machine Learning, Classification, Decision Tree, Random Forest, Neural Network, Naïve Bayes, Rapid Miner

PAPER ID: 114

Enhancing the Success of Information Technology Agile Projects through Principle-Based and Performance Domains of Project Management Body of Knowledge (PMBOK) Using Analytic Hierarchy Process (AHP) Model

Teguh Raharjo[1,a]

Bina Nusantara University[1]
Email: teguh.raharjo@binus.ac.id[a]

The development of agile implementation is currently still growing very rapidly, especially in the field of information technology (IT) and other related sectors. Despite its very rapid development, its implementation still has several problems and challenges. This study aims to provide solutions to existing problems by enhancing critical success factors (CSF) using the latest literature from the project management body of knowledge (PMBOK) principles and performance domain approach. A qualitative research method was employed to identify the CSFs, involving online interviews with more than 50 agile project management practitioners and experts in Indonesia. Additionally, a quantitative research can be done using AHP pair wise comparison according to organizational needs to get a ranking of existing CSFs. The results of this research offer a comprehensive list of CSFs for IT project implementation, particularly in Indonesia. Furthermore, this study provides practical contributions by offering a guide for implementing CSFs aligned with PMBOK principles and performance domains. The theoretical contribution is a list of CSFs for agile project management, based on literature review and the AHP model, aligned with PMBOK. The use of the latest PMBOK literature to address CSFs in agile project management serves as the main novelty of this study, as, to the best of the researcher's knowledge, no prior studies have addressed this.

Keyword: Critical Success Factors (CSF), PMBOK Principle-based and Performance Domain, Agile Project, CSF with Analytic Hierarchy Process (AHP)

PAPER ID: 115

Regtech Adoption Model Based on Risk Factors (Case Study Banking in Indonesia)

Vanya Louisa[1.a], Tanty Oktavia[1.b]

Department of Information System Management, BINUS Graduate Program – Master of Information System Management, Bina Nusantara University, Jakarta, Indonesia[1]

The confluence of global economic growth and expanding regulations has significantly increased the compliance burden on banks. This, in turn, has widened the gap between regulatory expectations and banks' ability to comply. Regtech, a rapidly evolving field of technology solutions designed to address regulatory challenges, offers a potential solution. This study investigates the factors influencing Regtech adoption in the Indonesian banking industry. This study propose a novel construct that integrates relevant bank risk factors, which are operational risk, reputational riska and compliance risk with established technology adoption models, namely the Technology Acceptance Model (TAM) and Task-Technology Fit (TTF). An online survey was conducted across Indonesia, targeting 31 commercial banks. A total of 135 active bankers participated. This study aims to identify key factors that can inform banks' strategies and decision-making processes regarding Regtech selection. Ultimately, the research seeks to define the technological direction for implementing Regtech solutions to support daily operations and compliance requirements.

Note: