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Aim and Scope

Journal of Mechatronics, Electrical Power, and Vehicular Technology (MEV) is an internationally peer-reviewed journal aims to provide authoritative global source of scientific information for researchers and engineers in academia, research institutions, government agencies, and industries. The Journal publishes original research papers, review articles and case studies focused on:

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FOREWORD FROM EDITOR-IN-CHIEF

Journal of Mechatronics, Electrical Power, and Vehicular Technology (MEV) is an international journal indexed by many internationally recognized indexers. Its Digital Object Identifier (DOI) Prefix is 10.14203. In this issue, five papers are published with the total number of 45 pages. The authors came from Indonesia, United Kingdom, Australia, and South Korea.

One paper is related to mechatronics which addresses an experimental review of distance sensors for indoor mapping. Another paper presents a preliminary study of biomechatronics for vehicular technology development. Three papers fall in the electrical power topic. The first paper deals with an optimization of hybrid SMES and CES using Cuckoo search algorithm for frequency stability improvement in a micro hydro power plant. The second paper investigates the performance of surface barrier discharge in magnetic field using a series resonance converter. The converter is used as a high voltage plasma generator, where the voltage is 5 kV with the frequency of 25 kHz. The third paper reports impacts of a biofuel use on a gas turbine operating performance. The experiments were conducted using a gas turbine with the capacity of 18 MW.

Since the first volume, our journal provides discretion in financial term by waiving the article processing charge. We wish to offer our thanks to the Indonesian Institute of Sciences (LIPI) for their continuing unwaving support. Also, we would like to acknowledge our immense gratitude to our International Editorial Board members, reviewers and authors.

We hope this publication would contribute to the enhancement of science and technology.

Bandung, December 2017

Editor-in-Chief

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ABSTRACTS SHEET

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Simulation of lumbar and neck angle flexion while ingress of paratransit (angkot) in Indonesia as a preliminary design study

Journal of Mechatronics, Electrical Power, and Vehicular Technology, December 2017, vol. 8, no. 2, p. 70-75, 7 ill, 1 tab, 44 ref.

This is the preliminary finding of a study to simulate lumbar and neck flexion while ingress to the paratransit. The result of simulation will determine design aspect criteria as a preliminary step before ideation and implementation design steps. Biomechanics of Bodies (BoB) is software that used to represent passenger task during paratransit ingress simulation, with skeleton model that used is height 165 cm and weight 65 kg. Environment to represent this simulation is measured Suzuki Carry SS 2013 as a private car that has been modified into a public transportation in accordance with the Indonesian government road-worthy test. Due to the low height of the entrance and the high ground clearance, lumbar and neck joint angle was a focus of this ingress simulation. The peak angle at the neck joint is 40° when 2 s skeleton nod in the door limitation ingress and lumbar flexion is 70° when 5 s skeleton is walking while bend over that will increase the load on that area. Based on biomechanical simulation approach, we may suggest the dimension of public transportation design framework developments, especially paratransit.

(Author)

Keywords: paratransits ingress; angkot; product design process; biomechanical simulation.

Muhammad Ruswandi Djalal[a,*], Herlambang Setiadi[b], Andi Imran[c] ([a]Department of Mechanical Engineering State Polytechnics of Ujung Pandang Jl. Perintis Kemerdekaan 7 km. 10, Makassar, Indonesia; [b]School of Information Technology & Electrical Engineering The University of Queensland, Level 4/General Purpose South Building (building 78) St. Lucia Campus, Brisbane, Australia; Dept. of Electrical Engineering, Sepuluh Nopember Institut of Technology, Jl. Raya ITS, Surabaya 60117, Indonesia)

Frequency stability improvement of micro hydro power system using hybrid SMES and CES based on Cuckoo search algorithm

Journal of Mechatronics, Electrical Power, and Vehicular Technology, December 2017, vol. 8, no. 2, p. 76-84, 13 ill, 6 tab, 22 ref.

Micro hydro has been chosen because it has advantages both economically, technically and as well as in terms of environmental friendliness. Micro hydro is suitable to be used in areas that difficult to be reached by the grid. Problems that often occur in the micro hydro system are not the constant rotation of the generator that caused by a change in load demand of the consumer. Thus causing frequency fluctuations in the system that can lead to damage both in the plant and in terms of consumer electrical appliances. The appropriate control technology should be taken to support the optimum performance of micro hydro. Therefore, this study will discuss a strategy of load frequency control by using Energy Storage. Superconducting magnetic energy storage (SMES) and capacitor energy storage (CES) are devices that can store energy in the form of a fast magnetic field in the superconducting coil. For the optimum performance, it is necessary to get the optimum tuning of SMES and CES parameters. The artificial intelligence methods, Cuckoo Search Algorithm (CSA) are used to obtain the optimum parameters in the micro hydro system. The simulation results show that the application of the CSA that use to tune the parameters of hybrid SMES-CES-PID can reduce overshoot oscillation of frequency response in micro hydro power plant.

(Author)

Keywords: micro hydro; superconducting magnetic-capacitive energy storage; Cuckoo; overshoot.

Midriem Mirdanies[a,*], Roni Permana Saputra[a,b] (Research Centre for Electrical Power and Mechatronics, Indonesian Institute of Sciences Komp. LIPI Bandung, Jl. Sangkuriang, Gd. 20, Lt. 2, Bandung 40135, Indonesia; [b]Dyson School of Design Engineering, Imperial College London, 10 Princes Gardens, South Kensington, London, UK)

Experimental review of distance sensors for indoor mapping

Journal of Mechatronics, Electrical Power, and Vehicular Technology, December 2017, vol. 8, no. 2, p. 85-94, 15 ill, 13 tab, 11 ref.

One of the most important required ability of a mobile robot is perception. An autonomous mobile robot has to be able to gather information from the environment and use it for supporting the accomplishing task. One kind of sensor that essential for this process is distance sensor. This sensor can be used for obtaining the distance of any objects surrounding the robot and utilize the information for localizing, mapping, avoiding obstacles or collisions and many others. In this paper, some of the distance sensor, including Kinect, Hokuyo UTM-30LX, and RPLidar were observed experimentally. Strengths and weaknesses of each sensor were reviewed so that it can be used as a reference for selecting a suitable sensor for any particular application. A software application has been developed in C programming language as a platform for gathering information for all tested sensors. According to the

experiment results, it showed that Hokuyo UTM-30LX results in random normally distributed error on measuring distance with average error 21.94 mm and variance 32.11. On the other hand, error measurement resulted by Kinect and RPLidar strongly depended on measured distance of the object from the sensors, while measurement error resulted by Kinect had a negative correlation with the measured distance and the error resulted by RPLidar sensor had a positive correlation with the measured distance. The performance of these three sensors for detecting a transparent object shows that the Kinect sensors can detect the transparent object on its effective range measurement, Hokuyo UTM-30LX can detect the transparent object in the distance more than equal to 200 mm, and the RPLidar sensor cannot detect the transparent object at all tested distance. Lastly, the experiment shows that the Hokuyo UTM-30LX has the fastest processing time significantly, and the RPLidar has the slowest processing time significantly, while the processing time of Kinect sensor was in between. These processing times were not significantly affected by various tested distance measurement.

(Author)

Keywords: distance sensors; Kinect; Hokuyo UTM-30LX; RPLidar; indoor mapping; autonomous mobile robot; C programming.

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The performance of surface barrier discharge in magnetic field driven by half bridge series resonance converter

Journal of Mechatronics, Electrical Power, and Vehicular Technology, December 2017, vol. 8, no. 2, p. 95-102, 11 ill, 1 tab, 19 ref.

This paper reports an application of a series resonance converter as a high voltage generator to drive a surface barrier discharge with a magnetic field. The high voltage was about 5 kV with the frequency of 25 kHz. It was connected to circular aluminum plates as the anode electrode and a rectangular aluminum plate as the cathode electrode. These electrodes were separated by a glass dielectric as the barrier. The experiment result indicated that the discharge current with magnetic field was lower than without magnetic field. The plasma on the surface barrier with magnetic field was more luminous than without magnetic field. It also indicated that the area of Lissajous diagram for the surface barrier discharge with magnetic field was slightly decreased than without magnetic field. It could be concluded that the magnetic field affects the plasma progress on the surface barrier. Molecular dynamic (MD) could be used in understanding the ionization process of air molecules. The ionization energies for CO_2, N_2, and O_2 were 0.0502 kcal/mol, 0.0526 kcal/mol and 0.430 kcal/mol, respectively in 1,000 seconds. The highest ionization energy was O_2.

(Author)

Keywords: Surface barrier discharge; magnetic field; series resonance converter; molecular dynamic; ionization energy.

Irhan Febijanto (Centre for Technology of Energy Resources Development, Deputy for Technology of Informatic, Energy and Mineral- BPPT, Cluster 5 of Energy Building, Puspiptek, Tangerang Selatan 15314)

The impacts of a biofuel use on the gas turbine operating performance

Journal of Mechatronics, Electrical Power, and Vehicular Technology, December 2017, vol. 8, no. 2, p. 103-114, 16 ill, 13 tab, 20 ref.

The use of Pure Plant Oil (PPO) as a fuel blend in a power plant is mandatory as stipulated in the Ministerial Decree of Energy and Mineral Resource of the Republic of Indonesia. However, the implementation of PPO used in power generation has many obstacles due to a lack of information concerning the impacts of PPO used in the operating performance of the power generation engine. In this study, the effect of PPO as a blended fuel with High-Speed Diesel (HSD) was studied by using the gas turbine with a capacity of 18 MW. The PPO was blended based on volume with a ratio of 0%, 5%, 10% and 20%. As the results, it is shown that the use of PPO with a blend ratio of 20% is the maximum fuel blend ratio according to the threshold value of a flue gas temperature and a vibration velocity in the gas turbine.

(Author)

Keywords: Gas turbine power plant; pure plant oil; high-speed diesel; blended fuel.