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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 paper pages of 40 pages. The authors come from Indonesia, Slovakia, Bulgaria, and United Kingdom. One paper is related to mechatronics which addresses design, manufacture, and performance analysis of an automatic antenna tracker for an unmanned aerial vehicle (UAV). One paper presents a preliminary investigation of sleep-related driving fatigue experiment in Indonesia.

Three papers fall in the electrical power topic. The first paper reports energy and exergy analysis of a photovoltaic (PV) system based on experiment results under typical climate in Yogyakarta. The result confirmes that temperature greatly affects the output of the PV system, besides the solar irradiance. The second paper proposes a method for condition assessment of power transformers based on moisture level using fuzzy logic. The method was implemented to assess conditions of 65 power transformers which are installed in the transmission system of Kosovo. The third paper presents a new principle of inductive vibration power harvester. The harvester is a pendulum that uses energy capacitor which is the mass. The experimental results indicate that the optimal results of the harvester with an accumulator shows especially for resonant zone 3.75 Hz, 7 Hz, and 10 Hz.

Since the first volume, our journal provides discretion in the 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, July 2018

Editor-in-Chief

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ABSTRACTS SHEET

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Arif Rahman Hakim*, Wahyu Tri Handoyo, Putri Wullandari (Loka Riset Mekanisasi Pengolahan Hasil Perikanan, Badan Riset dan Sumber Daya Manusia, Kementerian Kelautan dan Perikanan Jl. Imogiri Barat km 11.5, Jetis, Bantul, D.I Yogyakarta 55781, Indonesia)

An energy and exergy analysis of photovoltaic system in Bantul Regency, Indonesia

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2018, vol. 9, no. 1, p. 1-7, 6 ill, 2 tab, 12 ref.

Energy and exergy analysis has been conducted on photovoltaic (PV) system in Bantul Regency, a special region of Yogyakarta, Indonesia. The PV exergy analysis was used to determine the performance of the PV system by considering environmental factors other than solar irradiance. This research aims to obtain values of exergy and energy efficiencies in the PV system. The experiment results show that the energy efficiency value produced by the PV system was 8.62–74.18%, meanwhile its exergy efficiency was 0.29%-9.40%, respectively. The value of exergy efficiency is lower than the value of energy efficiency. This result confirmed that the environmental factor greatly affects the output of the PV system. It can be concluded that high solar radiation does not always increase the production of exergy, since it is also influenced by the environmental temperature and the PV cells' temperature.

(Author)

Keywords: exergy efficiency; energy; photovoltaic; solar radiation; Bantul Regency.

Kadek Heri Sanjaya[a]*, Yukhi Mustaqim Kusuma Sya'bana[a], Shaun Hutchinson[b], Cyriel Diels[b] ([a]Research Centre for Electrical Power and Mechatronics, Indonesian Institute of Sciences Jalan Cisitu No. 21/154D, Bandung, 40135, Indonesia; [b]Centre for Mobility and Transport, Coventry University Priory Street, Coventry, CV15FB, United Kingdom)

Preliminary investigation of sleep-related driving fatigue experiment in Indonesia

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2018, vol. 9, no. 1, p. 8-16, 10 ill, 0 tab, 42 ref.

Sleep-related driving fatigue has been recognized as one of the main causes of traffic accidents. In Indonesia, experiment-based driving fatigue study is still very limited, therefore it is necessary to develop a laboratory-based experimental procedure for sleep-related fatigue study. In this preliminary study, we performed a literature review to find references for the procedure and three pilot experiments to test the instruments and procedure to be used in measuring driving fatigue. Three subjects participated, both from experienced and inexperienced drivers. Our pilot experiments were performed on a driving simulator using OpenDS software with brake and lane change test reaction time measurement. We measured sleepiness by using Karolinska Sleepiness Scale (KSS) Questionnaire. The conditions of the experiment were based on illumination intensity as well as pre- and post-lunch session. We found that lane change reaction time is more potential than brake reaction time to measure driving performance as shown by more fluctuating data. Post-lunch seems to induce drowsiness greater than illumination intensity. KSS questionnaire seems non-linear with driving performance data. We need to test further these speculations in the future studies involving a sufficient number of subjects. We also need to compare the effect of circadian rhythm and sleep deprivation on driving fatigue. The use of eye closure and physiological measurement in further study will enable us to measure driving fatigue more objectively. Considering the limitations, more preliminary experiments are required to be performed before conducting the main experiment of driving fatigue.

(Author)

Keywords: driving fatigue; sleepiness; experiment procedure; driving simulation.

Vezir Rexhepi*, Petar Nakov (Technical University of Sofia, Faculty of Electrical Engineering, Boulevard "Sveti Kliment Ohridski", 8, 1000, Sofia Bulgaria)

Condition assessment of power transformers status based on moisture level using fuzzy logic techniques

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2018, vol. 9, no. 1, p. 17-24, 8 ill, 4 tab, 25 ref.

Power transformers are one of the most expensive components; therefore the focus on their status and its continuous operation is the primary task. In the power systems, condition assessment of performance and reliability is based on the state of components, measurements, testing, and maintenance as well as their diagnosis. Hence, condition assessment of power transformer parameters is important regarding their status and finding incipient failures. Among many factors, the most factors that affect the safe operation and life expectancy of the transformer is the moisture in oil. It is known that the low moisture oil in power transformers causes many problems including electrical breakdown, increase the amount of partial discharge, decreases the dielectric withstand strength and other phenomena. Thus, knowledge about the moisture concentration in a power transformer is significantly important for safe operation and lifespan. In this study, moisture level in oil is estimated, and its status classification is proposed by using fuzzy logic techniques for the power transformer monitoring and condition assessment. Moreover, the goal of the study is to find methods and techniques for the condition assessment of power transformers status based on the state of moisture in oil using the fuzzy logic technique. These applied techniques increase the power system reliability, help to reduce incipient failures and give the better maintenance plan using an algorithm based on logic rules. Also, by using the fuzzy logic techniques, it is easier to prevent

failures which may have consequences not only for transformers but also for the power system as a whole.

(Author)

Keywords: moisture in oil; power transformers; fuzzy logic techniques; failures; condition assessment; measurements.

Michal Černý*, Michal Dzurilla, Miloš Musil, Marek Gašparík (Faculty of Mechanical Engineering, Slovak University of Technology Námestie Slobody 17, 812 31 Bratislava, Slovakia)

Pendulum energy harvester with amplifier

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2018, vol. 9, no. 1, p. 25-31, 9 ill, 2 tab, 13 ref.

This paper presents a new principle of inductive vibration power harvester. Harvester is a pendulum that uses energy capacitor which is the mass. The mass is connected to the pendulum via a gearbox to achieve greater movement of the pendulum that generates an electromagnetic voltage. The harvester is developed at a very low frequency (1 to 10 Hz) which uses the rectified magnetic fluxes. Magnets are statically placed in the harvester case, and relative motion is carried out by the coil. Magnets are static, and the coil moves due to the weight ratio of magnets which the steel leads of the magnetic flux and the coil itself. This paper is focused on a harvester with a mechanical amplifier with the proposed technique is brings the plow harvester access with an auxiliary force. The experimental results indicate that the optimal results of the harvester with an accumulator for the resonant zone are 3.75 Hz, 7 Hz, and 10 Hz.

(Author)

Keywords: pendulum; energy; harvester; amplifier; vibration.

Gesang Nugroho*, Dicky Dectaviansyah (Department of Mechanical and Industrial Engineering, Faculty of Engineering, Universitas Gadjah Mada Yogyakarta 55281, Indonesia)

Design, manufacture and performance analysis of an automatic antenna tracker for an unmanned aerial vehicle (UAV)

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2018, vol. 9, no. 1, p. 32-40, 11 ill, 1 tab, 12 ref.

In conducting a disaster monitoring mission, an unmanned aerial vehicle (UAV) has to travel a long distance to cover the region that is hited by a disaster. In the monitoring mission, Air Data and Attitude Heading Reference System (ADAHRS) data are very important to always be displayed on the ground control station (GCS). Unfortunately, the area of monitoring mission is very wide, whereas the usage of an omnidirectional antenna in the disaster monitoring mission is limited to the UAV maximum range. Therefore, a high gain directional antenna is needed. However, the directional antenna has a disadvantage of always being directed to the target. To solve this problem, antenna tracker is made to track the UAV continuously so that the directional antenna can always be directed to the flying UAV. An antenna tracker using a 32-bit microcontroller and GPS with two degrees-of-freedom was developed. It is able to move 360 degrees on azimuth axis (yaw) and 90 degrees on elevation axis (pitch). Meanwhile, the directional antenna is three elements yagi type with a radiation capability of 6 dBi. By using the antenna tracker, larger UAV range was obtained and the connection between the UAV and the GCS could always be maintained with a minimum fluctuation of RSSI signal, compared to those without using antenna tracker.

(Author)

Keywords: UAV-antenna tracker; disaster monitoring; ground control station; UAV.