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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 recoginzed indexers. MEV Digital Object Identifier (DOI) Prefix is 10.14203. In this issue, seven papers are published with the total number of 69 paper pages. The authors come from Indonesia, PR China, United Kingdom, Australia, and Malaysia.

Two papers are related to mechatronics. One paper describes performance comparison for formation control of multiple nonholonomic wheeled mobile robots, and the other presents design and implementation of hardware in the loop simulation for electronic ducted fan rocket control system.

Three papers address topics on electrical power. The first paper deals with a compact design of multi-feeder data logging system for power quality measurement. The second paper describes a method to increase efficiency of a 33 MW OTEC in Indonesia using flat-plate solar collector. The third paper presents optimization of SMES and TCSC using particle swarm optimization for oscilation mitigation in a multi machine power system.

In the scope of vehicular technology there are two papers presented. The first paper reports a simulation study to compare RLS-GA and RLS-PSO algorithms for Li-ion battery SOC and SOH estimation. The second paper describes AFR and fuel cut-off modeling of LPG fueled engine using fuzzy logic controller.

Since the first volume, our journal provides convenience for authors to submit the paper by waiving the article processing charge. In order to improve the quality of the journal, we are on process to register the journal to international academic citation index. We wish to offer our thanks to the Indonesian Institute of Sciences (LIPI) for their perpetual supports. Also, we would like to acknowledge our immense gratitude to our International Editorial Board members, reviewers and authors for their great contributions for the advancement of this journal.

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

Bandung, July 2017

Editor-in-Chief

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ABSTRACTS SHEET

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Hendri Novia Syamsir[a,*], Dalila Mat Said[b], Yusmar Palapa Wijaya[a] ([a]Electronics Engineering, Polytechnic Caltex Riau, Jl. Umbansari No 1 Rumbai, Pekanbaru, Riau 28265, Indonesia; [b]Centre of Electrical Energy Systems (CEES), University Technology Malaysia (UTM), Johor Bahru 81310, Malaysia)

A compact design of multi-feeder data logging system for power quality measurement with a multiplexer and a single PQ transducer

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol. 8, no. 1, p. 1-10, 13 ill, 7 tab, 15 ref.

This paper presents a simple and costs effective equipment design multi-feeder data logger for recording and monitoring power quality. The system design uses remote supervising and multi-feeder data logging system (RESMOS). The data collected through resmos portable unit (RMPU) will automatically be saved with the format as binary and comma separated value (CSV). The time setting on the RMPU can be configured with minimum one minute per logging. This data logger uses a single transducer with a multiplexer for recording and monitoring ten channels of power quality at busbar. The system design has been validated with national metrology laboratory scientific and industrial research institute of Malaysia (SIRIM). This tool has the advantage that it can be used to measure harmonic data more than 21st at the same time for ten channels and equipped with software making it easier for analysis data with low operational costs versus another power quality equipment. The experimental results indicate that the proposed technique can accelerate data reading with conversion rate one sample per second for each channel. The device can be used to measure harmonic level and power quality with a confidence level above 95% and percentage error under 2.43% for total harmonics distortion (THD) and 1.72% for voltage harmonics.

(Author)

Keywords: harmonic; power quality; measurement; data logging; multi-feeder.

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

Optimization of SMES and TCSC using particle swarm optimization for oscillation mitigation in a multi machines power system

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol.8, no. 1, p. 11-21, 17 ill, 8 tab, 24 ref.

Due to the uncertainty of load demand, the stability of power system becomes more insecure. Small signal stability or low-frequency oscillation is one of stability issues which correspond to power transmission between interconnected power systems. To enhance the small signal stability, an additional controller such as energy storage and flexible AC transmission system (FACTS) devices become inevitable. This paper investigates the application of superconducting magnetic energy storage (SMES) and thyristor controlled series compensator (TCSC) to mitigate oscillation in a power system. To get the best parameter values of SMES and TCSC, particle swarm optimization (PSO) is used. The performance of the power system equipped with SMES and TCSC was analyzed through time domain simulations. Three machines (whose power ratings are 71.641, 163, and 85 MW) nine buses power system was used for simulation. From the simulation results, it is concluded that SMES and TCSC can mitigate oscillatory condition on the power system especially in lowering the maximum overshoot up to 0.005 pu in this case. It was also approved that PSO can be used to obtain the optimal parameter of SMES and TCSC.

(Author)

Keywords: Power System Oscillation; FACTS; SMES; TCSC; PSO.

Ali Alouache*, Qinghe Wu (School of Automation, Beijing Institute of Technology, Haidian District 100081, Beijing, PR China)

Performance comparison of consensus protocol and l-φ approach for formation control of multiple nonholonomic wheeled mobile robots

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol. 8, no. 1, p. 22-32, 20 ill, 1 tab, 24 ref.

This paper investigates formation control of multiple nonholonomic differential drive wheeled mobile robots (WMRs). Assume the communication between the mobile robots is possible where the leader mobile robot can share its state values to the follower mobile robots using the leader-follower notion. Two approaches are discussed for controlling a formation of nonholonomic WMRs. The first approach is consensus tracking based on graph theory concept, where the linear and angular velocity input of each follower are formulated using first order consensus protocol, such that the heading angle and velocity of the followers are synchronized to the corresponding values of the leader mobile robot. The second is l-□ approach (distance angle) that is developed based on Lyapunov analysis, where the linear and angular velocity inputs of each follower mobile robot are adjusted such that the followers keep a desired separation distance and deviation angle with respect to the leader robot, and the overall system is asymptotically stable.The aim of this paper is to compare the performances of the presented methods for controlling a formation of wheeled mobile robots with

matlab simulations.

(Author)

Keywords: Nonholonomic WMR; the leader-follower structure; graphtheory; consensus protocol; l-φ approach.

Iwan Rohman Setiawan[a], Irwan Purnama[a], Abdul Halim[b] ([a]Technical Implementation Unit for Instrumentation Development, Indonesian Institute of Sciences (LIPI), Kompleks LIPI Gd. 30, Jl. Sangkuriang, Bandung, Indonesia; [b]Department of Electrical Engineering, Faculty of Engineering, University of Indonesia Kampus Baru UI Depok 16424, Indonesia)

Increasing efficiency of a 33 MW OTEC in Indonesia using flat-plate solar collector for the seawater heater

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol. 8, no. 1, p. 33-39, 10 ill, 1 tab, 17 ref.

This paper presents a design concept of Ocean Thermal Energy Conversion (OTEC) plant built in Mamuju, West Sulawesi, with 33 MWe and 7.1% of the power capacity and efficiency, respectively. The generated electrical power and the efficiency of OTEC plant are enhanced by a simulation of a number of derived formulas. Enhancement of efficiency is performed by increasing the temperature of the warm seawater toward the evaporator from 26˚C up to 33.5˚C using a flat-plate solar collector. The simulation results show that by increasing the seawater temperature up to 33.5˚C, the generated power will increase up to 144.155 MWe with the OTEC efficiency up to 9.54%, respectively. The required area of flat-plate solar collector to achieve the results is around 6.023 x 10^6 m^2.

(Author)

Keywords: enhanced efficiency; OTEC plant; flat-plate solar collector; Mamuju West Sulawesi.

Latif Rozaqi[a*], Estiko Rijanto[a], Stratis Kanarachos[b] ([a]Research Center for Electrical Power and Mechatronics, Indonesian Institute of Sciences (LIPI), Kampus LIPI, Jalan Sangkuriang, Gd.20, Bandung 40135, Indonesia; [b]Centre for Mobility & Transport, Coventry University, United Kingdom)

Comparison between RLS-GA and RLS-PSO for Li-ion battery SOC and SOH estimation: a simulation study

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol. 8, no. 1, p. 40-49, 9 ill, 3 tab, 24 ref

This paper proposes a new method of concurrent SOC and SOH estimation using a combination of recursive least square (RLS) algorithm and particle swarm optimization (PSO). The RLS algorithm is equipped with multiple fixed forgetting factors (MFFF) which are optimized by PSO. The performance of the hybrid RLS-PSO is compared with the similar RLS which is optimized by single objective genetic algorithms (SOGA) as well as multi-objectives genetic algorithm (MOGA). Open circuit voltage (OCV) is treated as a parameter to be estimated at the same timewith internal resistance. Urban Dynamometer Driving Schedule (UDDS) is used as the input data. Simulation results show that the hybrid RLS-PSO algorithm provides little better performance than the hybrid RLS-SOGA algorithm in terms of mean square error (MSE) and a number of iteration. On the other hand, MOGA provides Pareto front containing optimum solutions where a specific solution can be selected to have OCV MSE performance as good as PSO.

(Author)

Keywords: Li-Ion; battery; state of charge (SOC); state of health (SOH); recursive least square (RLS); particle swarm optimization (PSO); genetic algorithm (GA).

Muji Setiyo*, Suroto Munahar (Department of Automotive Engineering, Universitas Muhammadiyah Magelang, Magelang, Indonesia, Jl. Bambang Sugeng km.05 Mertoyudan Magelang 56172)

AFR and fuel cut-off modeling of LPG-fueled engine based on engine, transmission, and brake system using fuzzy logic controller (FLC)

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol. 8, no. 1, p. 50-59, 12 ill, 3 tab, 42 ref.

During deceleration, continuous fuel flows into the engine not only causing over fuel consumption but also increasing exhausts emissions. Therefore, this paper presents a simulation of AFR and fuel cut-off modeling in the LPG-fueled vehicle using Fuzzy Logic Controller (FLC). The third generation of LPG kits (Liquid Phase Injection, LPI) was chosen due to its technological equivalency to EFI gasoline engine and promising to be developed. Given that the fuel system control is complex and non-linear, FLC has been selected because of simple, easy to understand, and tolerant to improper data. Simulation results show that the AFR and fuel cut-off controller able to maintenance AFR at the stoichiometric range during normal operation and able to cut the fuel flow at deceleration time for saving fuel and reducing emissions.

(Author)

Keywords: LPG-fueled engine; deceleration; FLC; AFR; fuel cut-off.

Reza Aulia Yulnandi*, Carmadi Machbub, Ary Setijadi Prihatmanto, Egi Muhammad Idris Hidayat (School of Electrical Engineering and Informatics, Institut Teknologi Bandung, Jl. Ganesha 10, Bandung 40132, Indonesia)

Design and implementation of hardware in the loop simulation for electric ducted fan rocket control system using 8-bit microcontroller and real-time open source middleware

Journal of Mechatronics, Electrical Power, and Vehicular Technology, July 2017, vol. 8, no. 1, p. 60-69, 20 ill, 2 tab, 12 ref.

Hardware in the Loop Simulation (HILS) is intended to reduce time and development cost of control system design. HILS systems are mostly built by integrating both controller hardware and simulator software where the software is not an open source. Moreover, implementing HILS by using manufactured system is costly. This paper describes the design and implementation of HILS for Electric Ducted Fan (EDF) rocket by using open-source platform for development with middleware. This middleware system is used to bridge the data flow between controller hardware and simulator software. A low-cost ATMEGA 2560 8-bit microcontroller is used to calculate rocket's attitude with Direction Cosine Matrix (DCM) algorithm and PID controller is employed to regulate rocket's dynamics based on desired specifications. X-Plane 10 simulator software is used for generating simulated sensory data. The test results validate that HILS design meets the defined specifications, i.e. angle difference of 0.3 degrees and rise time of 0.149 seconds on pitch angle.

(Author)

Keywords: HILS; DCM; open-source platform; X-Plane; middleware; EDF rocket.