Guest Editors' Introduction to Special Issue on *Industrial Internet of Things (IIoT)*

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THIS special issue in the Internetworking Indonesia Journal (IIJ) represents the selected papers presented in the International Conference on Industrial Internet of Things (ICIIoT) 2015 held in Samosir Island, North Sumatra, Indonesia on September 7-9, 2015. The international conference was organized by the IEEE Indonesia Control Systems Society and Robotics and Automation Society Joint Chapter (IEEE Indonesia CSS/RAS Joint Chapter). The conference is the first conference in the area of the rapidly developed Internet of Things (IoT) for industries.

The international conference addresses the most recent topics in Industrial Internet of Things (IIoT) in research stages, in industrial developments, and also in applications. The goal of the conference is to provide to a scientific forum for academics, researchers, and practitioners in order to share ideas, experiences, vision, and information in this rapid and emerging technology.

In this special issue, 16 papers were selected to represent the investigation, the development, and the application of Transportation, Data Mining and Monitoring, Network Technologies and Control, and Software and Security.

The paper "Road Travel Time Prediction using Vehicular Network", by Sejoon Lim, presents the road travel time prediction performance of the regularized least squares (RLS) and sparsity-based regularization (SBR) methods. It is found that the SBR method shows a better prediction performance than the simple RLS algorithm. The SBR algorithm with feature mapping yields even better prediction. In "Daytime Road Marker Recognition using Grayscale Histogram and Pixel Values", Zamani Md Sani, Hadhrami Abd Ghani, Rosli Besar and W.S. Loi consider a vision system for lane marker detection method by means of new algorithm applying the gray level histogram average median in defining the threshold value to counter the illumination issues and the average median pixel count algorithm for the road marker classification process. The algorithm has been tested at three different times namely in the morning, afternoon, and evening. The system results in a high detection accuracy even at low light condition. The paper "A Food Ordering System with Delivery Routing Optimization Using Global Positioning System (GPS) Technology and Google Maps", by Roy Deddy Hasiholan Tobing, develops an online food ordering system by applying a heuristic algorithm in order to resolve the classic Travelling Sales Problem (TSP) optimization problem. The system is then implemented by using the Global Position Systems (GPS) technology with Android-based mobile phone. The work gets advantage of Google Maps for coordinate-to-map solution.

In "Energy Aware Distributed Estimator System over Wireless Sensor Networks with Ad-hoc On-Demand Distance Vector (AODV) Routing Algorithm", Husnul Abady and Endra Joelianto consider a comparison of the performance of the combined centralized-decentralized Kalman filter with the centralized Kalman filter and the decentralized Kalman filter for state estimation over wireless sensor network. It is found that the energy aware AODV routing algorithm in wireless sensor network is able to reduce energy consumption of a sensor. The energy consumption of each architecture and the difference between the energy aware and the regular AODV algorithm are also discussed. The paper "A Comparison of SVM and RVM for Human Action Recognition", by Vina Ayumi and Mohamad I. Fanany, presents two classification techniques in human action recognition recorded in video by using two classification techniques, Relevance Vector Machine (RVM) and Support Vector Machine (SVM). Experimental studies yield that RVM gives better performance, requires fewer testing time and is more robust than SVM on action recognition. However, RVM needs longer training time. RVM model is more general and encloses minimum basis function. In addition, RVM makes good classification on action recognition with large dataset. Arjon Turnip and Artha I. Simbolon present in "Online Brain Activity Extraction from EEG-P300 Signals with Nonlinear Autoregressive Model" an application of nonlinear autoregressive model for brain activity by using extracted signals from EEG-P300. The classification of the extracted signals is carried out by implementing an adaptive neural network classifier method. The result is then tested by using comparative experiments that are conducted with Bayesian Linear Discriminant Analysis. All tested subjects yield perfect classification.

The paper "Ambient Environmental Quality Monitoring Using IoT Sensor Network", by Arko Djajadi and Michael Wijanarko, considers a solution to environmental sustainability problems especially in ambient environmental quality

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ISSN: 1942-9703 / © 2016 IIJ

monitoring using IoT sensor technology. An Internet of Things (IoT) module has been developed for either indoor or outdoor applications and static or mobile deployments. The system has been tested and it has helped in increasing environmental quality awareness. In "The Application of Internet of Things System for Water Quality Monitoring", Tito Yuwono, Luqman Hakim, Irfan Ardi, and Umar develop a water quality monitoring system based on IoT. Several components, such as pH sensor, microcontroller, RF modem, and servers are integrated to form the IoT system. BTA and Xbee PRO are used as pH sensor and RF modem, respectively. Experimental results show that the IoT based water quality monitoring system works properly and the transmission with 2 repeaters for LOS outdoor is 3000m and NLOS outdoor is 2050m. The paper "Attenuation Measurement of Laboratory-Based PLC Implementation", by Intan S. Areni, Elyas Palantei, Ansar Suyuti, Adnan, Weni S. Yusnita, and Heni Susanti, investigates Power Line Communication (PLC) in laboratory in order to assess the performance of the transmitted signal into several values of frequency variations using PLC. The testing takes into account the variations of the distance between transmitter and receiver by measuring and recording the power line attenuation. Experiment results show that there exists attenuation variability in the constructed PLC system. The numerical evaluation is also conducted by varying the NYM cable sizes.

In "A Distance-Based Approach for Binary-Categorical Data Bi-Clustering", Sadikin Mujiono presents the description and the experimental results for binary categorical data by using bi-clustering based on the Hamming Distance (HD) measurement in order to obtain a collection of bi-sets. Evaluation and analysis of the proposed method achieve the required performances which indicate suitability for the application in the area. The Match Score (MS) parameter for the feasibility of the method has good values for overlapping bi-set experiments, minimum value, maximum value, and the perfect MS value of one for extracting disjoint bi-set. The paper "EEG-Based Brain-Controlled Wheelchair with Four Different Stimuli Frequencies", by Arjon Turnip, Demi Soetraprawata, Mardi Turnip, and Endra Joelianto, investigates control of electronic wheelchair movement by means of a non-invasive brain computer interface using EEG-SSVEP signals over visual cortex for forward, backward, left, and right movements. Data are obtained from testing conducted by four subjects in a similar age. The data are then used to get the classification method with some parameters by using offline training of the adaptive-network based fuzzy inference system algorithm. The proposed classification method yields high accuracy level in classification which can be used to enhance the performance of the existing BCI system.

The paper "A Small Signal State Space Model of Inverter-Based Microgrid Control on Single Phase AC Power Network" by Sutanto Hadisupadmo, Arista Nugroho Hadiputro, and Augie Widyotriatmo present the modeling of the inverter-based microgrid control on a single-phase alternating-current (AC) network. Each subsystem of the microgrid, i.e. inverter, network and load is modeled and combined to acquire the complete model for droop based control system design. The paper considers two Distributed Generations (DGs) in which each DG is interfaced to an inverter connected to the load through a network. The inverters and loads form a network with line connection of two nodes or buses. The droop gains are found by using the pole placement method. The effectiveness of the method is shown by simulation. In "A Model of Turbo Encoder Based on Field Programmable Gate Array (FPGA) for Nano Satellite Application", Laila Prakasita, Heroe Wijanto, and Budi Syihabuddin consider nanosatellite communication schemes by simulating and comparing the image transmission using nano satellite communication designed without channel code with a specific turbo code. The best turbo code is then applied in FPGA for nano satellite application and simulation results show that the FPGA resource has performances below the FPGA resource constraints.

Pardede and Mira Musrini Barmawi, in their paper "Implementation of LSI Method on Information Retrieval for Text Document in Bahasa Indonesia", present the application of Latent Semantic Indexing (LSI) method for Information retrieval system in order to get the information required by users. The system is to look for and to gather documents using overall meaning of documents from typical text documents in *doc, *.docx, or *.pdf formatted. It utilizes Nazief and Adriani Algorithm in preprocessing phase to eradicate the affix of a word and then to match them in database root word. The quality of information retrieval performances, such as time response, values of recall and precision are measured and evaluated. Multithreading from 'read document' to stemming process is also included in order to look up the time responses. The results show the required time response is more efficient for greater number of terms in the document collection. The fastest time response is given by the docx format, followed by doc and pdf formats, respectively. An error "OutOfMemoryError" is generated for 80 documents and more. The increase of the number of documents requires more memory for the retrieval process. In, "Design an Advanced Botnet to Monitor User Awareness on Harmful Malware Using VertexNet", Albert Sagala and Alexander Lumbantobing consider problems related to infected computers by malware. Malware cannot be mitigated by installing antivirus as malware designers make botnet masked from antivirus. Malware infection causes the PC harmful as it is manipulated by C&C servers. VertexNet bot loader is considered by using a botnet in order to increase awareness of people with infected PC. The paper "Metadata of Dashboard Data Source Based on Study of Pentaho Dashboard Metadata" by Rosni Lumbantoruan, Agnes Juliana Siregar, Erikson Matondang, and Marisa Helen Gultom presents an analysis of application of two dashboards to metadata. The dashboards are "Metadata for Creating and Displaying Dashboard" and open source

Pentaho dashboard. The dashboards are analyzed in order to observe that the dashboard metadata has reached the metadata structure of data warehouse by using comparison. The metadata that satisfies the data warehouse metadata structure is then mixed for the development of new metadata prototype called Meta ++ for assistance of the performance of metadata generator in generating real metadata in the form XML file from information given by the user.

The guest editors would like to thank to Editorial Board of IIJ and especially Dr. Thomas Hardjono as the Chief Editor for his support, encouragement, and advice from preparation until finalization of the papers presented at the International Conference on Industrial Internet of Things (ICIIoT) 2015 in the Internetworking Indonesia Journal (IIJ). The contribution from the authors is gratefully acknowledged. The guest editors would like to congratulate all authors for their efforts in preparing such papers. The editors wish that the readers will find this issue not only stimulating but also useful and practicable in Internet of Things (IoT) areas.

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