ISITIA
2018

PROCEEDING

International Seminar on Intelligent Technology and Its Application 2018

August 30 – 31, 2018
Swiss-Belresort Watu Jimbar, Bali, Indonesia

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Preface

Welcome to the 2018 International Seminar on Intelligent Systems and its Applications, or ISITIA. We are very grateful to all attendees today, including all of you who have submitted your recent research work to our conference and present your findings in this event.

In our records, the total submissions to ISITIA 2018 received 152 submissions with authors affiliated with institutions from 13 different countries. We accepted 92 papers for presentation. These papers belong to various topics such as power systems, telecommunications, electronics, control systems, biomedical engineering, and intelligent systems.

ISITIA has its roots from SITIA, or simply Seminar on Intelligent Systems and its Applications, a conference that had started 19 years ago, and have been held annually by our department ever since. We wish to provide a forum where researchers, academics, students, and industry to meet and discuss the latest development in the broad field of electrical engineering, telecommunications, and intelligent systems. In this age of the next industrial revolution, we feel that it is very important that we can extend our research to practical aspects. Hence, “Practical Prospect on New Technologies: From Theory to Industrial Challenges and Business Opportunities” becomes our conference theme this year.

This conference has received tremendous help and support, therefore we would like to thank all reviewers, mainly from three different countries, for their contributions in selecting high quality papers. We would also like to thank Toulouse INP and in particular the LAPLACE laboratory, as well as Udayana University, for their support to this conference. Our gratitude also goes to to Institut Teknologi Sepuluh Nopember, Surabaya, and members of our local organizing committee for the support and help for the conference.

Lastly, please have a great time at the conference, and we wish you a very pleasant stay in Bali, Indonesia.

Dr. Istas Pratomo

ISITIA 2018 General Chair

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Information Systems

KEYNOTE LECTURE

Biomedical Engineering

Prof. Dr. Mohammad Nuh, DEA
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"Biomedical Engineering Development in Indonesia: Challenges and Opportunity"

Indonesia will experience a new era in health services with the enacted Universal Health Coverage (UHC) for all Indonesian people. The program was implemented gradually starting January 1, 2014 for 116 million people and by 2019 will implement for all Indonesians (260 million people). The implementation of UHC is carried out by The Implementing Agency of Social Security or Badan Penyelenggara Jaminan Sosial Kesehatan (BPJS-Kesehatan) as a mandate of the Law Number 36 of 2009 concerning Health and Law Number 24 of 2011 concerning The Implementing Agency of Social Security.

The implementation of UHC promotes the significant increase in demand of healthcare services. This includes the number of beds, doctors, nurses, medical equipments, pharmaceuticals and support services. In addition, the number of middle classes (middle income) is growing rapidly. From 130 million people (55.2%) in 2010 to 215 million people (80%) by 2020. The increasing population of middle class will improve the awareness of the importance of health. This factor could be market driven in the biomedical engineering development.

The development of science and technology, especially material technology, the Internet of Things, technological convergence, the need to improve quality of life and increased purchasing power capacity are appropriate ecosystems in developing Biomedical Engineering.

Biomedical Engineering development in Indonesia is based on point of view science and technology, market opportunity for medical equipment and healthcare system, resources availability, humanity value and the spirit of self-fulfilling in the field of healthcare services. Assistive technology, mobile healthcare, wearable technology, medical imaging, and artificial intelligence are the focus areas but not limited for developing Biomedical Engineering in Indonesia.

As the pioneering stage, the Ministry of Education and Culture in 2012 provided a mandatory assignment to Institut Teknologi Sepuluh Nopember (ITS), Institut Teknologi Bandung (ITB), Universitas Indonesia (UI), Universitas Gadjah Mada (UGM) and Universitas Airlangga (UNAIR) to establish Department and Research Center of Biomedical Engineering.

Muhammad Nuh (born 17 June 1959 in Surabaya) is the former Minister of Education and Culture of Indonesia in the Second United Indonesia Cabinet of Susilo Bambang Yudhoyono. Prof. Nuh was born on 17 June 1959 in Surabaya into a large farming family. By profession an electrical engineer, he was educated at Sepuluh Nopember Institute of Technology and Montpellier 2 University, France. More info: https://opensciencemeeting.org/prof-dr-ir-mohammad-nuh-dea/.

KEYNOTE LECTURE

Modeling and the control of the electric systems

Prof. Maurice Fadel
National Polytechnic Institute of Toulouse - LAPLACE
maurice.fadel@laplace.univ-tlse.fr

"Some Advances of Control in Power Electronics: Predictive and Allocation Method"

Static converter based power electronic systems and electrical power conversion systems using electrical machines require high performance while preserving simple designs and easy implementations. This situation becomes critical when the processed powers increase and the converters have a large number of switches for topologies to increase power through serialization and / or paralleling. In this context it is important to develop new control approaches such as predictive control or allocation control.

The predictive control applied to static converters offers simple and often effective solutions for conventional structures. When the number of switches increases the combinatorial explosion of the controls induces a limitation especially when the operating frequency is high. For this purpose the allocation approach based on the minimization of a criterion in real time is proposed as an alternative solution allowing further reconfiguration of the system during the appearance of faults.

As for static converters, electrical machines are now associated in cooperative systems, which produces multi-machine and multi-converter systems. The design of control laws becomes more complex especially if we take into account the improvement of energy efficiency. This presentation provides an overview of recent developments in this area, drawing on examples of multilevel static converters and synchronous magnet machines alone or in cooperation for high speed aeronautical or automotive applications. Implementation procedures will also be discussed and illustrated through examples deployed on DSPACE or implemented on FPGAs.

Maurice Fadel was born in Toulouse (France). He got the PhD degree at the Institut National Polytechnique de Toulouse in 1988, in the domain of the Control in Electric Engineering. He is currently a Professor in the Ecole Nationale Supérieure d'Ingénieurs en Electrotechnique, d'Electronique, d'Informatique, d'Hydraulique et de Télécommunications of Toulouse (ENSEEIHT). More info: http://www.laplace.univ-tlse.fr/FADEL-Maurice-1464?lang=en.

KEYNOTE LECTURE

Modeling modal method (plasma cavity, SIW circuits, transmission line) closer to the physical, wave concept iterative process, numerical analysis

Prof. Nathalie Raveu
National Polytechnic Institute of Toulouse - LAPLACE
raveu@laplace.univ-tlse.fr

"Propagation in Waveguides with Metamaterial Walls"

With the increasing needs of communications equipment for space applications, it is important to minimize the size and mass of satellite equipment. This leads to a reduction in the launch costs of the satellites in their orbit or allows the possibility of adding equipment to the rocket. The objective is to reduce the antenna or waveguide dimensions without deteriorating their performances (directivity, cross polarization, monomode band, etc.).

It is possible to control the propagation of electromagnetic waves in horn antennas and waveguides using anisotropic walls (corrugations, metamaterials). Thus, expected propagation constants and radiation properties of electromagnetic waves differ from in classical horn antennas and waveguides using anisotropic walls in such structures: for the waveguide, cutoff frequency reduction is possible; for the horn antenna, improvement of the directivity or reduction of side lobe level.

A new design methodology based on an Expanded Modal Theory Theory (TME) is proposed to characterize waveguides with anisotropic walls in collaboration with CNES agency and the MVG Company. It makes it possible to dimension very quickly metamaterial surfaces most adapted to the required applications. A prototype waveguide was designed, manufactured and measured using this methodology. The results obtained demonstrate the interest, efficiency and general character of the proposed method for the design of guided microwave devices with anisotropic walls.

Nathalie Raveu received the M.S. degree in electronics and signal processing in 2000 and the Ph.D. degree in 2003.She is a Professor with the National Polytechnic Institute of Toulouse (INPT) and a Research Fellow with the LAPLACE—CNRS (LAboratory of Plasma and Energy Conversion). More info: http://www.laplace.univ-tlse.fr/RAVEU-Nathalie-1119?lang=en.

KEYNOTE LECTURE

Relay Protection, Power Transmission, Power Systems,
Transformer designers

Ir. Eko Yudo Pramono, M.T.
General Manager Dispath Center
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"Implementation of HVDC System for Improving Java Bali System"

Java Bali Grid is the largest electricity system in Indonesia, with its peak load reaching 25.880 MW on Tuesday, 08th May 2018 and total installed generating capacity of 36.211 MW. The transmission lines consist of 500 kV as the backbone with total length of 5.074 kmc. Power plants are connected to various transmission voltage, but the trend is that more bigger plants are connected to 500 kV main backbone. Currently the biggest plant unit is 815 MW, but starting on 2021 units of 1.000 MW ultra super critical coal-fired power plant will come on-line. Investment plan as stipulated in the RUPTL 2018-2027 dictates more than 12.000 MW of 1GW units will be commisioned within the next 10 years, and all will be connected to 500 kV transmission lines. Although these units will run at higher efficiency and lower generation cost, concern arises on the aspect of 500 kV system stability and capability to accommodate such amount of 1 GW units into the Java-Bali Grid. The short circuit level contribution from these plants will run significantly high above the existing breaker rating, at some point will reach more than 90 kA. Not only that, stability of the system after losing one or two 1 GW unit in contingencies also will be of concern. Therefore the study of grid impact of these 1 GW units is needed, including alternatives to improve grid stability and robustness. Possible solutions include new higher voltage of backbone such as 765 kV AC, or developing an HVDC system in Java Bali either it is DC link or HVDC back to back system. The DC system will be able to split system into several areas hence lowering the short circuit level, also isolate any fault propagating across grid therefore avoid the possibility of total black out. This will in turn increases the robustness of Java Bali grid. This lecture looks at the implementation of HVDC system to improve Java Bali grid, and proposes a distict merit of apply HVDC technology into the grid.

Curriculum vitae:

2016 – present	: General Manager Dispath Center, PT. PLN (Persero) P2B
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2009 – 2012	: Planning Manager PT PLN (Persero) P3B Sumatera