



UEC Workshop 2020

THE 2ND ASEAN - UEC WORKSHOP ON ENERGY AND AI

21 November 2020 | Institute Teknologi Bandung, Indonesia by Online

Conference Organizer



WELCOME MESSAGE FROM UEC



I would like to welcome all of you to the 2nd ASEAN-UEC Workshop on Energy and AI, which is held in Bandung, Indonesia. I am very pleased that UEC and ECTI collaboration with ITB hold this WS despite such COVID-19 environment.

This year we expanded the WS theme from AI and Applications at the 1st ECTI-UEC Workshop to Energy and AI at the 2nd ASEAN-UEC Workshop. Then we have totally 10 invited speakers and 25 poster presentations. The authors are from Indonesia, Thailand, Vietnam, Hong Kong, and Japan. So the conference scope and speakers nationalities have been expanded from the 1st WS.

UEC is now going ahead with its new “UEC vision” to establish a global base to practice “Comprehensive Communication Sciences.” Being one of the key research universities in Japan, UEC puts emphasis on promoting close collaborative links with ASEAN partner universities. In this sense, I believe that this workshop is a great opportunity to further enhance the collaboration between ASEAN universities, institutions, governments and UEC.

I hope that you will find this international workshop stimulating and rewarding academically, technically, and socially.

Again, welcome to the 2nd ASEAN-UEC Workshop on Energy and AI.

Dr. Kohji Abe,
Member of the Board of Directors
(International Strategies)
The University of Electro-Communications

WELCOME MESSAGE FROM ITB



This year we are grateful to be appointed as host of the 7th ASEAN UEC Seminar (2020) and the 2nd ASEAN UEC Energy and AI Workshop. Energy and Artificial Intelligence are two interesting topics nowadays that have also been included in our education program in Bandung Institute of Technology alongside sustainability concerns. As host, this joint seminar and workshop should have been held in our main campus in Bandung city of Indonesia. However, due to pandemic circumstances, it must be held virtually. We wish the best for the continuity of this event to strengthen relationship and to build common platform for future cooperation. We also would like to thank the University of Electro-Communications for sponsoring and organizing this annual event.

Prof. Suhono Supangkat

Director of Smart City and Community Innovation Center of ITB

MESSAGE FROM ORGANIZING COMMITTEE CHAIRS



Welcome to the 2nd ASEAN-UEC Workshop on Energy and AI

After the 1st ECTI-UEC Workshop on AI and Applications has been launched in 2019 at Rajamangala University of Technology Krungthep (RMUTK), Bangkok, Thailand, the steering committee considered and decided to organize the workshop in Bandung, Indonesia in 2020, and also welcome researchers and research works on energy so that the workshop name has been changed to ASEAN-UEC workshop on Energy and AI. Unfortunately, due to COVID-19 pandemic occurring in the beginning of 2020, the workshop has been extended to Nov 21, 2020, and organized by online style.

In 2020, the technical program committee have accepted 25 regular papers for poster presentation from researchers around the world, and invited 10 well known professors and researchers in energy and AI fields as invited speakers of the workshop.

On behalf of the organizing committee, we sincerely appreciate authors, reviewers, committee and many people who worked behind the scene for their great contributions. We look forward to welcoming you to the ASEAN-UEC Workshop on Energy and AI.

Abdul Waris (ITB)

Gusti Bagus Baskara Nugat (ITB)

Koichiro Ishibashi (UEC)

Kosin Chamnongthai (KMUTT)

COMMITTEE

General Co Chair

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- Kosin Chamnongthai (ECTI and KMUTT)
- Prof. Suhono Supangkat (ITB)

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- Prof. Abdul Waris, ITB

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- Prof. Nuttaphong Sornsuwit, KMUTNB
- Prof. Pham Cong Kha, UEC & UAREC & GAL
- Prof. Ryuji Takahashi, UEC & UAREC
- Prof. Koji Higuchi, UEC & UAREC
- Prof. Hiroki Furukawa, UEC & UAREC & GAL
- Prof. Koji Enoki, UEC
- Prof. Bagus Santoso, UEC

PROGRAM

The workshop is held on line by Online
on 21 November 2020 (Saturday)

13:00 - 15:40 Session I, Plenary and Invited talks Place: Main room of Zoom			
Time	Programs	Name and affiliation	Title
13:00	Introductory Talk	Prof. Kosin Chamnongthai, KMUTT and ECTI	
13:10	Invited Talk	Prof. Abdul Waris, ITB/ID	Nuclear Energy Research Collaboration Between UEC and ITB
13:25	Invited Talk	Dr. Indri Yaningsih, UNS/ID	The progress in adsorption technologies for energy sustainability
13:40	Invited Talk	Prof. Ohkawa Tomio, UEC/JP	Studies on nuclear reactor thermal hydraulics in UEC
13:55	Invited Talk	Dr. Arwindra Rizqiawan, ITB/ID	DC Microgrid as a Solution for Remote Island Electrification
14:10	Invited Talk	Dr. Satit Mangkalajan, KMUTNB/TH	Robust Digital Control of Electromagnetic Levitation
14:25	Invited Talk	Prof. Chanon Warisarn, KMITL and ECTI/TH	Application of Artificial Neural Networks to Signal Processing in Magnetic Recording Systems
14:40	Invited Talk	Prof. Minami Yasuhiro, UEC/JP	On Researches in the Artificial Intelligence EXploration Research Center of the University of Electro-Communications
14:55	Invited Talk	Prof. Tran Xuan Tu, VNU-UET/VN	Fully On-Chip Ternary Weight Hardware Architecture for Deep Spiking Neural Network
15:10	Invited Talk	Dr. Agung Budi Sutiono, U. of Padjadjaran/ID	Neural network in the brain and artificial intelligence: Applied IT and Neurosurgery
15:25	Invited Talk	Dr. Tran The Son, VKU U. of Danang/VN	Li-Fi technology towards 5G

15:40 - 15:50 Break			
15:50 - 17:20 Session II Poster presentations, Place: Poster Room A of Zoom, Poster Room B of Zoom, Poster Room C of Zoom			
	Poster Room	Session Theme	Session Chair
	Session II-A, Poster Room A of Zoom	Energy and Material	Prof. Abdul Waris, ITB
	Session II-B, Poster Room B of Zoom	AI and Applications	Prof. Bagus Santoso, UEC
	Session II-C, Poster Room C of Zoom	Information and Electronics	Prof. Nuttaphong Sornsuwit, KMUTNB
17:20 - 17:30 Break			
Place: Main room of Zoom			
17:30 - 17:50	Award sessions	Young Researcher Encouledgement Award	from General Co chairs
Place: Main room of Zoom			
17:50 - 18:00	Closing Remarks		Prof. Pham Cong-Kha

POSTER PRESENTATIONS

Poster Presentations 15:50 - 17:20			
<p style="text-align: center;">Session Poster A Chair : Prof. Abdul Waris, ITB Place : Poster Room A of Zoom</p>			
Time	Programs	Name and affiliation	Title
15:50	Poster A - 1	Dodi Budiana/U. Indonesia	The Economies Comparison of Well Head Gas and Liquefied Natural Gas Power Plant in Aceh Province
16:00	Poster A - 2	Takuto Kobayashi, Ren Watanabe, Yusuke Otomo and Koji Enoki/UEC	Elucidation of pressure drop characteristics in sintered fibrous porous tubes using permeability and tube friction coefficient and construction of rearranging correlation
16:10	Poster A - 3	Yusuke Otomo, Edgar Santiago Galicia, Toshihiko Saiwai, Kenji Takita, Toshihiro Zushi and Koji Enoki/UEC	The enhancement of subcooled flow boiling heat transfer with high porosity sintered fibrous metal
16:20	Poster A - 4	Edgar Santiago-Galicia, Yusuke Otomo and Koji Enoki/UEC	Effect of mass flux on high porosity sintered fiber on subcooled flow boiling.
16:30	Poster A - 5	Cici Wulandari, Abdul Waris, Sidik Permana and Syeilendra Pramuditya/ITB	Neutronic Performances of 100 MWe MSR with High Grade Plutonium
16:40	Poster A - 6	Robi Dany Riupassa, Abdul Waris, Khairul Basar, Novitrian Novitrian, Yazid Bindar and Cici Wulandari/ITB	Modeling of Safety System on Modified Freeze Valve in a Molten Salt Reactor
16:50	Poster A - 7	Swastya Rahastama and Abdul Waris/ITK, ITB	THE ELECTRICAL PERFORMANCE PREDICTION OF DEEP TRENCHES ETCHED Ni-63/Si BETA-VOLTAIC USING FD-MCDE
17:00	Poster A - 8	Anni Nuril Hidayati, Abdul Waris, Asril	Experimental Study of Solid Low-Density Tilted Plate's Erosion by

		Pramutadi Andi Mustari and Dwi Irwanto, ITB	Low Melting Temperature Molten Materials
17:10	Poster A - 9	Ahmad Imam Rifa'i, Koji Enoki, Budi Kristiawan and Agung Tri Wijayanta/politeknik Jambi, UEC, UNS	Analysis on Significance of Nanofluids as the Working Fluid for Double Tube Heat Exchanger Applications
Session Poster B Chair : Prof. Bagus Santoso, UEC Place : Poster Room B of Zoom			
15:50	Poster B - 1	Saluky Saluky, Suhono Harso Supangkat and Igb Baskara Nugraha/ITB	Abandoned Object Detection and Classification Using CNN
16:00	Poster B - 2	Hanavi Hanavi and Fadhil Hidayat/ITB	Intelligent Video Analytic for Suspicious Object Detection : A Systematic Review
16:10	Poster B - 3	Erdenemaa Nyamdorj, Keiji Yanai and Erdenemaa Nyamdorj/UEC	Generation of Multiple Meal Images Based on Sketch Images
16:20	Poster B - 4	Akihiko Nagashima, Takeru Aoki, Keiki Takadama and Hiroyuki Sato/UEC	A Study on Multivariate CLA Complementing Missing Time-series Data
16:30	Poster B - 5	Okti Nindyati and I Gusti Bagus Baskara Nugraha/ITB	Detecting Scam in Indonesian Online Job Vacancy
16:40	Poster B - 6	Takeru Aoki, Keiki Takadama and Hiroyuki Sato/UEC	A preliminary study on a multi-layered cortical learning algorithm
16:50	Poster B - 7	Jiang Min/UEC	Points and Lines Based Feature Matching and 3D Reconstruction
17:00	Poster B - 8	Kosin Chamnongthai and Sunusi Abdullahi/KMUTT	Classification of Highly Correlated ASL Gestures for Ubiquitous Sign Language Recognition System
Session Poster C Chair : Prof. Bagus Santoso, UEC Place : Poster Room C of Zoom			
15:50	Poster C - 1	Yuki Iwata, Koichiro Ishibashi, Guanghao Sun, Luu Manh Ha, Han Trong Thanh, Nguyen Linh	Non-contact Heartbeat Detection under Respiratory Artifact from CW-Doppler Radar Measurement with Matched Filtering

		Trung and Do Trong Tuan/UEC,VNU-UET,HUST	
16:00	Poster C - 2	Hiroya Ueoka, Daichi Hagiwara and Hideo Isshiki/UEC	Coalesced Epitaxial Diamond Thin Film on Si Synthesised by Employing Highly Oriented Nucleation and α Parameter Modulation
16:10	Poster C - 3	Eriyanto Adhi Setyawan and Fadhil Hidayat/ITB	Web Services Security and Threats: A Systematic Literature Review
16:20	Poster C - 4	Ayumu Kiyokawa and Varun Vohra/UEC	Efficient ultra low-cost solar cells fabricated with green & sustainable push-coated organic active layers
16:30	Poster C - 5	Ryo Kumagai, Tomoaki Takagi, Keiki Takadama and Hiroyuki Sato/UEC	A study on multi-objective evolutionary stage generation using MarioGAN
16:40	Poster C - 6	Bonnie Ngai-Fong Law/The Hong Kong Polyteck	Camera Identification in Image Forensics
16:50	Poster C - 7	Van Binh Dang and Van Phuc Hoang/LQDTU	Energy Efficient Temperature Beat Sensor for IoT Based Drought Monitoring Systems
17:00	Poster C - 8	Uthai Borworntamajak/KMUTT	Wireless Battery Charger For Low Power Devices Using Capacitive Power Transfer Principle

Table of Contents

Invited Talks

1	Nuclear Energy Research Collaboration Between UEC and ITB Prof. Abdul Waris, ITB/ID	1
2	The progress in adsorption technologies for energy sustainability Dr. Indri Yaningsih, UNS/ID	2
3	Studies on nuclear reactor thermal hydraulics in UEC Prof. Ohkawa Tomio, UEC/JP	3
4	DC Microgrid as a Solution for Remote Island Electrification Dr. Arwindra Rizqiawan, ITB/ID	4
5	Robust Digital Control of Electromagnetic Levitation Dr. Satit Mangkalajan, KMUTNB/TH	5
6	Application of Artificial Neural Networks to Signal Processing in Magnetic Recording Systems Prof. Chanon Warisarn, KMITL and ECTI/TH	6
7	On Researches in the Artificial Intelligence EXploration Research Center of the University of Electro-Communications Prof. Minami Yasuhiro, UEC/JP	7
8	Fully On-Chip Ternary Weight Hardware Architecture for Deep Spiking Neural Network Prof. Tran Xuan Tu, VNU-UET/VN	8
9	Neural network in the brain and artificial intelligence: Applied IT and Neurosurgery Dr. Agung Budi Sutiono, U. of Padjadjaran/ID	9
10	Li-Fi technology towards 5G Dr. Tran The Son, VKU U. of Danang/VN	10

Regular Paper

11	The Economies Comparison of Well Head Gas and Liquefied Natural Gas Power Plant in Aceh Province Dodi Budiana/U. Indonesia	11
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12	Elucidation of pressure drop characteristics in sintered fibrous porous tubes using permeability and tube friction coefficient and construction of rearranging correlation Takuto Kobayashi, Ren Watanabe, Yusuke Otomo and Koji Enoki/UEC	12
13	The enhancement of subcooled flow boiling heat transfer with high porosity sintered fibrous metal Yusuke Otomo, Edgar Santiago Galicia, Toshihiko Saiwai, Kenji Takita, Toshihiro Zushi and Koji Enoki/UEC	13
14	Effect of mass flux on high porosity sintered fiber on subcooled flow boiling. Edgar Santiago-Galicia, Yusuke Otomo and Koji Enoki/UEC	14
15	Neutronic Performances of 100 MWe MSR with High Grade Plutonium Cici Wulandari, Abdul Waris, Sidik Permana and Syeilendra Pramuditya/ITB	15
16	Modeling of Safety System on Modified Freeze Valve in a Molten Salt Reactor Robi Dany Riupassa, Abdul Waris, Khairul Basar, Novitrian Novitrian, Yazid Bindar and Cici Wulandari/ITB	16
17	The Prediction of Ni-63/Si Deep Trenches Design Betavoltaic Electrical Using FD-MCDE Swastya Rahastama, Abdul Waris, Ferry Iskandar and Sparisoma Viridi /ITK, ITB	17
18	Experimental Study of Solid Low-Density Tilted Plate's Erosion by Low Melting Temperature Molten Materials Anni Nuril Hidayati, Abdul Waris, Asril Pramutadi Andi Mustari and Dwi Irwanto, ITB	18
19	Analysis on Significance of Nanofluids as the Working Fluid for Double Tube Heat Exchanger Applications Ahmad Imam Rifa'I, Koji Enoki, Budi Kristiawan and Agung Tri Wijayanta/politeknik Jambi, UEC, UNS	19
20	Abandoned Object Detection and Classification Using CNN Saluky Saluky, Suhono Harso Supangkat and Igb Baskara Nugraha/ITB	20
21	Intelligent Video Analytic for Suspicious Object Detection : A Systematic Review Hanavi Hanavi and Fadhil Hidayat/ITB	21
22	Generation of Multiple Meal Images Based on Sketch Images Erdenemaa Nyamdorj, Keiji Yanai and Erdenemaa Nyamdorj/UEC	22

23	A Study on Multivariate CLA Complementing Missing Time-series Data Akihiko Nagashima, Takeru Aoki, Keiki Takadama and Hiroyuki Sato/UEC	23
24	Detecting Scam in Indonesian Online Job Vacancy Okti Nindyati and I Gusti Bagus Baskara Nugraha/ITB	24
25	A preliminary study on a multi-layered cortical learning algorithm Takeru Aoki, Keiki Takadama and Hiroyuki Sato/UEC	25
26	Points and Lines Based Feature Matching and 3D Reconstruction Jiang Min/UEC	26
27	Highly Correlated ASL Gestures for Ubiquitous Sign Language Recognition System Kosin Chamnongthai and Sunusi Abdullahi/KMUTT	27
28	Non-contact Heartbeat Detection under Respiratory Artifact from CW-Doppler Radar Measurement with Matched Filtering Yuki Iwata, Koichiro Ishibashi, Guanghao Sun, Luu Manh Ha, Han Trong Thanh, Nguyen Linh Trung and Do Trong Tuan/UEC,VNU-UET,HUST	28
29	Coalesced Epitaxial Diamond Thin Film on Si Synthesised by Employing Highly Oriented Nucleation and α Parameter Modulation Hiroya Ueoka, Daichi Hagiwara and Hideo Isshiki/UEC	29
30	Web Services Security and Threats: A Systematic Literature Review Eriyanto Adhi Setyawan and Fadhil Hidayat/ITB	30
31	Efficient ultra low-cost solar cells fabricated with green & sustainable push-coated organic active layers Ayumu Kiyokawa and Varun Vohra/UEC	31
32	A study on multi-objective evolutionary stage generation using MarioGAN Ryo Kumagai, Tomoaki Takagi, Keiki Takadama and Hiroyuki Sato/UEC	32
33	Camera Identification in Image Forensics Bonnie Ngai-Fong Law/The Hong Kong Polyteck	33
34	Energy Efficient Temperature Beat Sensor for IoT Based Drought Monitoring Systems Van Binh Dang and Van Phuc Hoang/LQDTU	34
35	Wireless Battery Charger For Low Power Devices Using Capacitive Power Transfer Principle Uthai Borworntamajak and Kamon Jirasereeamornkul/KMUTT	35

Nuclear Energy Research Collaboration Between UEC and ITB

Adul Waris

ABSTRACT

At the end of 20th Century, Generation IV International Forum (GIF) has selected the six types of Generation IV nuclear power plant (NPP) technology which are expected to be operated from 2030. They are GFR (Gas-Cooled Fast Reactor), LFR (Lead-Cooled Fast Reactor), MSR (Molten Salt Reactor), SFR (Sodium-Cooled Fast Reactor), SWCR (Supercritical-Water-Cooled Reactor), dan VHTR (Very-High-Temperature Reactor).

Amongst the six types of Generation IV NPP, MSR is the only NPP system with liquid fuel type, which has become the main reason to us to take part in the development MSR technology. In this seminar, the nuclear energy research collaboration activities between ITB and UEC Tokyo research groups will be discussed. These research activities consist of: collaborative research, information exchange, visiting professor, sandwich program, master/doctor program, and short visit/ training, ect.

The progress in adsorption technologies for energy sustainability

Indri Yaningsih

ABSTRACT

Providing thermal comfort involves the efforts on how to control proper parameters, including humidity, temperature, and quality of the air, such as hygiene, air-speed, and the pressure difference between the conditioned space with the surroundings. Combining these parameters, indeed, becomes a great challenge for air conditioning researchers and engineers. Nowadays, the air conditioning system development is moving towards a high-performance system with a low energy requirement. The adsorption system is considered a potential standalone dehumidification air conditioner considering their huge advantage in reducing energy consumption. However, compared with the traditional vapor compression system, the adsorption system has a low performance. Many technologies have been used to improve their performance. However, in the case of the solid desiccant material, the heat and mass transfer between the surface of the desiccant material and air stream is very low, which is not sufficient for achieving the dehumidification load. Thus, it is essential to investigate the heat and mass transfer characteristics of the desiccant dehumidification system, which is expected to improve the performance. Several types of research are motivated by adjusting the essential parameters, for instance, regeneration/activation temperature, air mass flow rate, and adsorption working pairs. The critical parameter influence, including the humidity and temperature to the heat and mass transfer characteristics, is also developed. These studies provide an attempt to establish an effective adsorption dehumidification system under high temperature and relative humidity. We provide the heat and mass transfer calculation inside the adsorption system, which is considered the interface properties between the air stream and desiccant material. The mathematical solution for heat and mass transfer characteristics is based on the iteration method thermal resistance concept. Important parameters including the temperature of adsorption, the temperature of regeneration, relative humidity, and mass flowrate are evaluated to investigate the effect of the regeneration temperature on the heat and mass transfer characteristics in Nusselt number (Nu) for heat transfer and Sherwood number (Sh) for mass transfer. The proposed empirical correlation is provided in this study, which was developed by using the experimental data. It is suggested that the interface properties must be carefully acquired to reduce the discrepancy between the experimental data and analytical.

Studies on nuclear reactor thermal hydraulics in UEC

Ohkawa Tomio

ABSTRACT

Nuclear power is of crucial importance to achieve no CO₂ emission by 2050. It is therefore obvious that safety of nuclear power plants must be enhanced. In this invited talk, studies of nuclear reactor thermal hydraulics going on in UEC are summarized. The studies are regarding (1) Liquid jet breakup and splashing (sodium cooled fast reactor), (2) Subcooled flow boiling (light water reactor), (3) Droplet entrainment in annular two-phase flow (light water reactor), (4) Salt melting in freeze plug (molten salt reactor), and (5) Quenching of hot wall with a liquid film (light water reactor). Several other fundamental studies may be mentioned.

DC Microgrid as a Solution for Remote Island Electrification

Arwindra Rizqiawan and Pekik Argo Dahono

ABSTRACT

Indonesia is an archipelago country with more than 17000 islands, many of them are less populated. At present, the electrification ration is not yet reached 100% with many remote islands are still do not have access to electricity. A microgrid system is suitable for application in such isolated remote islands. Local renewable energy sources may be fully utilized, for example solar photovoltaic, wind, biomass, or microhydro. Direct current (DC) microgrid has the advantage of easy load sharing and no synchronization issue as in AC counterpart. Series of proposed DC-DC power converter topology which is suitable for application of DC microgrid is discussed here. The required DC-DC converter should have high efficiency and high voltage conversion range features. Configuration of DC microgrid suitable for application in remote areas in Indonesia is also discussed. Local cluster of energy source and loads are connected independently but energy sharing between clusters is possible through the main DC bus.

Robust Digital Control of Electromagnetic Levitation

Satit Mangkalajan, Kamon Jirasereeamornkul and Koji Higuchi

ABSTRACT

This propose is the design of robust digital control systems of magnetic levitation system. The magnetic levitation system use in magnetic levitation train or Maglev. So, the stable of the system is importance. However, the dynamic characteristic of magnetic levitation is high non-linear. The classical control is not suite with system. The robust control is PI control combine with Approximate 2 Degree Of Freedom (A2DOF). It call is PIA2DOF control. The PIA2DOF can fast change distance between coil with magnetic ball when setpoint sudden change. It is found that the PIA2DOF controller can into a steady state using time $< 0.1s$. The simulation using MATLAB/Simulink and experimental results are shown. The method proposed are verified by simulation and experimental.

Application of Artificial Neural Networks to Signal Processing in Magnetic Recording Systems

Chanon Warisarn

ABSTRACT

As we know that the artificial neural networks (ANNs) are widely used in communication systems since they can provide high performance when they were compared with conventional signal processing schemes. In this time, we present an application of the long-short term memory (LSTM) networks, convolution neural networks (CNN), and multi-layer perceptron (MLP), that are most used in current research works of ultra-high density magnetic recording technologies. Moreover, the possibility of the use of ANNs in ultra-high density magnetic recording systems will be presented and shown that they can provide superior performance over the traditional processing algorithms. As illustrated in Fig. 1, the LSTM network is applied for deciding all three coded data sequences in the coded system of ultra-high density magnetic recording where the better performance can be easily obtained over the traditional processing algorithms.

On Researches in the Artificial Intelligence Exploration Research Center of the University of Electro- Communications

Minami Yasuhiro

ABSTRACT

In this talk, I am going to introduce the Artificial EXploration Advanced Research Center, which was established for artificial intelligence research at the University of Electro-Communications. I'm also going to describe some of the research being conducted at it. The Artificial Intelligence Advanced Research Center is the first artificial intelligence research center of Japanese national universities. It promotes new artificial intelligence research that creates Artificial General Intelligence by integrating many different fields, including artificial intelligence, robotics, neuroscience, computer science, and service science. In this way, the center aims to create an "extremely versatile artificial intelligence system that can coexist with people and respond appropriately to them" and support future social infrastructure.

The center's abbreviation, AIX, expresses its basic philosophy. AIX means "AI for X." This X is comprised of various aspects denoted by three main axes: "AI for Science," "AI for Design," and "AI for Service." The common foundation is "artificial general intelligence." In this talk, I introduce some research based on this basic philosophy.

Fully On-Chip Ternary Weight Hardware Architecture for Deep Spiking Neural Network

Xuan-Tu Tran, Duy-Anh Nguyen, Khanh N. Dang and Francesca Iacopi

ABSTRACT

Nowadays, Deep Spiking Neural Network (DSNN) has become a promising neuromorphic approach for various AI-based applications, such as image classification, speech recognition, robotic control etc. on edge computing platforms. However, the state-of-the-art offline training algorithms for DSNNs are facing two major challenges: (i) many timesteps are required to reach comparable accuracy with traditional frame-based DNNs algorithms; (ii) extensive memory requirements for weight storage make it impossible to store all the weights on-chip for DSNNs with many layers. Thus the inference process requires continue access to expensive off-chip memory, ultimately leading to performance degradation in terms of throughput and power consumption. In this talk, we will address the design and implementation approach of Fully On-Chip Ternary Weight Hardware Architecture for Deep Spiking Neural Network. Some preliminary results on CMOS technology will be reported and discussed.

Neural network in the brain and artificial intelligence: Applied IT and Neurosurgery

Agung Budi Sutiono

ABSTRACT

A typical brain contains 100 billion minuscule cells called neurons. Each neuron is made up of a cell body (the central mass of the cell) with a number of connections coming off it: numerous dendrites (the cell's inputs-carrying information toward the cell body) and a single axon (the cell's output-carrying information away).

On the other side a computer, the equivalent to a brain cell is a nanoscopically tiny switching device called a transistor. The latest, cutting-edge microprocessors (single-chip computers) contain over 30 billion transistors; even a basic Pentium microprocessor from about 20 years ago had about 50 million transistors, all packed onto an integrated circuit just 25mm square (smaller than a postage stamp).

Combination between the brain and artificial intelligence in computer science will make a powerful strategy to manage traumatic brain injury (TBI). In clinical practice at emergency room hospital, it is not easy to decide the best treatment for the patient. Meanwhile the injured neural cells in the brain is ongoing situation. Disruption of neural cells connection might cause permanent neurological deficits or even mortality. The pre hospital examination data before referring to the trauma center will help us if we could utilize the computer artificial intelligence (AI) based on the patient's clinical information. The Developing Traumatic Brain Injury Integrated Intelligence systems has been helped our hospital to decrease morbidity and mortality.

Li-Fi technology towards 5G

Tran The Son

ABSTRACT

The fifth-generation (5G) mobile network is the next paradigm shift in the revolutionary era of the wireless communications that might break the backward compatibility of existing communication systems. It offers a much higher data transmission rates, higher capacity, superior spectrum efficiency, higher reliability, energy efficiency, reduced latency compared to current LTE and 4G technologies. To do so, many technologies such as Massive Multiple-Input and Multiple-Output (MIMO), millimeter wave (mmWave) communication, Non-Orthogonal Multiple Access (NOMA), Full-Duplex (FD) communications, Optical Wireless Communication (OWC), Software-Defined Networking (SDN) and so on have been recently applied for the 5G networks.

Visible light communication (VLC) – a background of an emerging network called Li-Fi, working in visible light spectrum (i.e. around 380nm ~780nm) is considered as a promising candidate for the next generation networks including 5G since it is able to provide communication in THz bandwidth (400THz ~ 700 THz). While RF spectrum is known as very dense with too many networks and services working on it such as maritime/aviation radio channels, television, mobile networks, GPS, Wi-Fi, 4G, 5G, satellite, etc., visible light spectrum is known as a unused spectrum for data communications. Therefore, VLC could be exploited and co-existed with 5G to provide services to users in the context of the next generation communication networks, especially in nanocell and picocell network structures.

This talk will outline the growth of VLC and 5G, then present the challenges and roadmap of VLC as well as the potential of co-existence of VLC to the 5G for the next generation of wireless networks.

The Economies Comparison of Well Head Gas and Liquefied Natural Gas Power Plant in Aceh Province

Dodi Budiana

ABSTRACT

The Aceh Province Electricity System is supplied by Gas Engine Power Plant (GEPP) fuelled by Liquefied Natural Gas (LNG), Coal-fired power plant and Diesel Engine with Diesel fuel and transfers from the North Sumatra system during peak loads. LNG fuel is sent by ship from the Tangguh Papua Refinery which is regasified in Perta Arun Gas, Lhokseumawe, Aceh Province, so the production costs are expensive due to the distance from the gas supply sources. To get cheaper electricity production costs, it can be done by using the gas potential in Aceh province. In this study, the economic value will be calculated by comparing the use of two types of gas fuel, namely wellhead gas fuel and LNG gas for Gas Turbine and Gas Engine power plants, to determine the cost of electricity production for each power plant with the same fuel. Based on the calculation results, gas engine power plant with fuel from the Wellhead Gas has the best production costs with value of 1,262.21 Rp/ kWh lower than the electricity tariff of 1,467 Rp /kWh, and has an IRR of 24.78% and a payback period of 4,88 years. By knowing the most economic value for the construction of powerplant with Wellhead Gas, it can be used as a basis for policy making in choosing an economical power plant development for areas with gas potential, such as in Aceh province.

Elucidation of pressure drop characteristics in sintered fibrous porous tubes using permeability and tube friction coefficient and construction of rearranging correlation

Takuto Kobayashi, Ren Watanabe, Yusuke Otomo and Koji Enoki

ABSTRACT

Heat exchangers are used in many industrial products, and miniaturization and high performance of heat exchangers are so important for mechanical element design. In recent years, researches using small tubes and porous materials have been widely conducted to improve the performance of heat exchangers. Above all, it has been clarified from past research that a tube made by sintering a fibrous porous body inside the same material has improved heat transfer performance with low pressure drop. It cannot be, however, said that the pressure drop performance of this sintered fibrous porous tube has been fully clarified, and elucidation of the pressure drop performance of this tube will contribute to the entire industry association. In this study, pressure drop was experimentally obtained, and the results were used to clarify the performance of the main tube by using the Re and tube friction coefficient obtained from the permeability.

The enhancement of subcooled flow boiling heat transfer with high porosity sintered fibrous metal

Yusuke Otomo, Edgar Santiago Galicia, Toshihiko Saiwai, Kenji Takita,
Toshihiro Zushi and Koji Enoki

ABSTRACT

In order to improve the performance of subcooled flow boiling heat transfer, metal fiber was sintered and attached to the copper surface. Metal-fiber porous material with high porosity (86 %) was selected to reduce the effect on hydraulic diameter and differential pressure as small as possible. The test section is 10 mm×10 mm rectangular channel, heat flux, and pressure drop was measured. Deionized water was used as a working fluid, inlet subcooled temperature was 30-70 K, mass flux 150-600 kg·m⁻² ·s⁻¹ . According to the experimental results, in two phase region, the heat flux was improved around 30-50 % in comparison to bare surface. Moreover, compared at the same heat flux ($q = 2500 \text{ kW}\cdot\text{m}^{-2}$) and subcooled temperature 70 K, the increase of wall superheat was suppressed by 10-18 K. It found that the enhancement of heat transfer was improved as porous height increased under this experimental condition.

Effect of mass flux on high porosity sintered fiber on subcooled flow boiling

Edgar Santiago-Galicia, Yusuke Otomo and Koji Enoki

ABSTRACT

High heat transfer has been investigated due to the high cooling performance necessities of several engineering applications. Experimental research was conducted using four different porous thickness (0, 0.2, 0.5, 1mm) attached on the heating surface under low mass flux (150, 300, 450, 600 $\text{kg}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) and atmospheric pressure conditions, distilled water was used as working fluid. Results shows that using high porosity sintered fiber attached on the surface the heat flux presented an enhancement of around 1.8 times in comparison with the bare surface. Mass flux influence reported a higher amount of heat flux at higher mass flux. Results of the mass flux influence on the heat flux is discussed.

Neutronic Performances of 100 MWe MSR with High Grade Plutonium

Cici Wulandari, Abdul Waris, Sidik Permana and Syeilendra Pramuditya

ABSTRACT

An advanced nuclear reactor Generation IV, Molten Salt Reactor (MSR), has been developed with Thorium utilization for a sustainable energy system. In this study, the reactor is designed with a power operation of 250 MWt in 5 years without refueling. Fuel salt is composed of a eutectic FLiBe, Thorium (Th), and Plutonium (Pu), as a coolant, fertile, and fissile nuclide, respectively. Plutonium loaded is a high-grade that consists of ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu , ^{242}Pu , and ^{241}Am . The neutronic performance is calculated using program code CITATION in SRAC 2006 with JENDL 4.0 as a nuclear data library. The result shows some neutronic parameter changes with increasing Pu loaded. The utilization of Pu is described as a capability of MSR in burning a high-level waste of nuclear and radioactive isotopes.

Modeling of Safety System on Modified Freeze Valve in a Molten Salt Reactor

Robi Dany Riupassa, Abdul Waris, Khairul Basar, Novitrian Novitrian,
Yazid Bindar and Cici Wulandari

ABSTRACT

Molten Salt Reactor (MSR) uses a freeze valve to overcome the reactor core temperature rise due to the decay heat after shutdown. The freeze valve functions as a blockage which will automatically open when the reactor core temperature rises. When the blockage opens, the fuel from the reactor core will flow to the emergency dump tank. In this study, a modification of the freeze valve design was developed from other researchers with a new type that would give more heat transfer modes. This new type consists of two parts, namely the head plug and neck plug and added heating rings. The design specifications of this system will be tested for fuel in the form of FLiNaK (LiF-NaF-KF: 46.4-11.5-42 mole%). Heating rings, reactor vessels, and drainage pipes use Hastelloy-N material. Freeze valve uses Cesium Chloride (CsCl). Computer modeling is based on computational fluid dynamics (CFD) to determine the melting behavior of a modified freeze valve.

The Prediction of Ni-63/Si Deep Trenches Design Betavoltaic Electrical Performance Using FD-MCDE

Swastya Rahastama and Abdul Waris

ABSTRACT

In basic planar betavoltaic structure, some of beta particles are not utilized effectively to generate electronhole pairs inside the semiconductor. In order to improve the utilization of beta source that would be deposited at the surface of the battery, we proposed the deep trenches design and calculated the prediction model of its electrical performance using finite difference minority carrier diffusion equation (FD-MCDE). The deep trenches p-n junction was evaluated by dividing it into several regions according to the energy deposition profile at each cell. Herein, we employ Ni-63 radioisotope as the beta source coupled with silicon semiconductor. In comparison to the basic planar design, the deep trenches could give an overall improvement in electrical performance, which the maximum power density and conversion efficiency can be increased about 29.60%.

Experimental Study of Solid Low-Density Tilted Plate's Erosion by Low Melting Temperature Molten Materials

Anni Nuril Hidayati, Abdul Waris, Asril Pramutadi Andi Mustari
and Dwi Irwanto

ABSTRACT

The behaviour of molten jet on a tilted plate is one of important behaviour when the jet continuously impinges in a certain time. It can simulate the heat transfer and solidliquid interface reaction such as on the molten fuel impingement to sacrificial plates. This study focused on the erosion rate and molten pool effect which occurred on the tilted paraffin plate. The plate was tilted at 15° from xaxis. The molten materials were varied such as water, oil, paraffin, candle and lubricant oil and set at 90°C of initial flow temperature. The molten jet was preheated on a stainless steel chamber and gravitationally accelerated through 5 mm diameter of nozzle tip. The experiments were captured by some cameras and a thermal camera to analyse the temperature distribution during impingement process. The results showed some different erosion rate, spread patterns and leading edge of each kind of molten materials. The density and thermal conductivity will affect the pool extinguish on the plate surface. The experimental result could predict the erosion on the tilted plate during impingement of molten fuels to the sacrificial plates.

Analysis on Significance of Nanofluids as the Working Fluid for Double Tube Heat Exchanger Applications

Ahmad Imam Rifa'I, Koji Enoki, Budi Kristiawan and Agung Tri
Wijayanta/politeknik Jambi

ABSTRACT

Nanofluid technology has had a positive effect on increasing the value of the heat transfer coefficient. In this study investigated the effect of adding nanoparticles into the base fluid on the increase in the rate of heat transfer in a double pipe heat exchanger. The results showed that the addition of nanoparticles into the base fluid with a significant increase in heat transfer significantly.

Abandoned Object Detection and Classification Using CNN

Saluky Saluky, Suhono Harso Supangkat and Igb Baskara Nugraha

ABSTRACT

Automatic supervision become a trend today, abandoned objects is one of the hot topics of concern to many researchers because it has a challenge to improve the accuracy and efficiency of the memory and in dealing with noise, shadow, illumination, occlusion and hustle. In this poster we propose a solution by implementing one of the deep learning implementations to improve the accuracy of detecting abandoned objects with classification using CNN after objects are detected with traditional detection. This method can verify that these objects are objects that are abandoned and not a shadow.

Review Paper : Intelligent Video Analytic for Suspicious Object Detection, A Systematic Review

Hanavi Hanavi and Fadhil Hidayat

ABSTRACT

Conventional surveillance systems such as CCTV still have limitations that merely viewing and recording. This limitation causes its function to only be passive monitoring and unable to provide real-time early warning systems. The increasing need in the field of security, especially in public places, requires a solution in the form of a system that can detect suspicious objects through video surveillance systems. Recent studies seek to integrate computer vision, image processing and artificial intelligence in video surveillance applications. Although there are many datasets, methods and frameworks available in previous research, there are still few papers that discuss the use of intelligent video analytics in detecting suspicious objects. This paper will comprehensively and systematically review the literature on applying machine learning for object detection and video surveillance systems published between 2010 and 2020. The literature extraction process is carried out by identifying and analyzing papers to describe the scope of research to detect suspicious objects using intelligent video analytics, frameworks, methods, datasets and suspicious characteristics. At the end of this paper, several opportunities and challenges have been described related to research on suspicious object detection using video analytics.

Generation of Multiple Meal Images Based on Sketch Images

Erdenemaa Nyamdorj, Keiji Yanai and Erdenemaa Nyamdorj

ABSTRACT

In recent years, deep learning enables us to generate high-definition images that can be mistaken for real images. In this work, we generate an image of a meal before it is cooked. Especially, we focus on generating multiple-food images from segmentation mask images, since no researches have been done before. In the experiment, we generated multiple-food images using the UECFoodPIX data and SPADE.

A Study on Multivariate CLA Complementing Missing Time-series Data

Akihiko Nagashima, Takeru Aoki, Keiki Takadama and Hiroyuki Sato

ABSTRACT

This work proposes a cortical learning algorithm handling multivariate input data to maintain the time-series data prediction even if a part of input data is missing. Experimental results using artificial time-series data shows that the proposed method can maintain the time-series prediction by using related data even the input data is continuously missing.

Detecting Scam in Indonesian Online Job Vacancy

Okti Nindyati and I Gusti Bagus Baskara Nugraha

ABSTRACT

In order to design a qualified training program, Training Need Analysis (TNA) should be conducted before establish a training program. But unfortunately there have been many fraudulent job ads by individuals on behalf of the company. In order to overcome the problem, an employment scam detection is required. This research proposed an employment scam detection using behavioral context based features to determine whether a job advertisement is legitimate or fraudulent.

A Preliminary Study on a Multi-layered Cortical Learning Algorithm

Takeru Aoki, Keiki Takadama and Hiroyuki Sato

ABSTRACT

This work proposes a multi-layered cortical learning algorithm. The cortical learning is a time-series data prediction algorithm designed based on the human neuro-cortex. The human neuro-cortex has a multilayer structure, while the conventional cortical learning algorithm has a single layer. This work introduces a multi-layer structure into the cortical learning algorithm. The experimental results show that the proposed multi-layered cortical learning algorithm achieves higher prediction accuracy than the single-layered cortical learning algorithm.

Points and Lines Based Feature Matching and 3D Reconstruction

Jiang Min

ABSTRACT

In this paper, we propose a point and line based feature matching and 3D reconstruction method to reduce fragmentation of line features and let visual-SLAM(Simultaneous Localization and Mapping) works in textureless environments. Line segments are merged to reduce fragmentation. Lines information is then took into account to ORB-SLAM2 [1] framework by using line descriptor with points. Moreover, an optimized key frames selection method is also proposed. We compared our method with PLSLAM [2] for KITTI [3] dataset, and the fragmentation problem has been considerably improved.

Highly Correlated ASL Gestures for Ubiquitous Sign Language Recognition System

Kosin Chamnongthai and Sunusi Abdullahi

ABSTRACT

American Sign Language suffer highly correlated gestures, sometimes at the start or at end of the sign path. This poses a significant challenge to signer specially when signing gesture words of opposite meaning, thus confuses the translation algorithm. In this paper, we trained a bidirectional Long Short-Term memory to learn long-term dependencies between complete gesture sequence at each time step (both present and past hand path information). Therefore, we specially choses gestures with close similar patterns and opposite meaning, using ubiquitous SLR. The proposed algorithm, when evaluated using classification accuracy achieved 81%.

Non-contact Heartbeat Detection under Respiratory Artifact from CW-Doppler Radar Measurement with Matched Filtering

Yuki Iwata, Koichiro Ishibashi, Guanghao Sun, Luu Manh Ha, Han Trong Thanh, Nguyen Linh Trung and Do Trong Tuan

ABSTRACT

This paper presents a novel algorithm for non-contact heart rate (HR) estimation by using continuous wave-Doppler radar. The proposed algorithm achieves accurate and robust HR estimation under respiratory artifact using the signal-to-noise ratio (SNR) recovery technique based on a matched filter method. Although the matched filter requires a high SNR waveform as a template, we provided one solution to this task by designing a scheme to adaptively extract the heartbeat template using singular value decomposition algorithm. In this research, several parameters of the scheme were optimized for the practical use by a numerical model. We performed an experiment on 212 subjects to evaluate our method. As a result, the HR estimation was achieved within 5 bpm in 81 subjects, which is 1.65 times higher than the previous study in our group.

Coalesced Epitaxial Diamond Thin Film on Si Synthesised by Employing Highly Oriented Nucleation and α Parameter Modulation

Hiroya Ueoka, Daichi Hagiwara and Hideo Isshiki

ABSTRACT

In this study, a diamond thin film was synthesized on a Si substrate using the microwave-plasma-enhanced chemical vapor deposition (MP-CVD). We demonstrated for 1) highly oriented nucleation by atomic silicon microaddition, 2) coating of (100) by α parameter modulation, and 3) coalescent of diamonds.

Review Paper: Web Services Security and Threats, A Systematic Literature Review

Eriyanto Adhi Setyawan and Fadhil Hidayat

ABSTRACT

Privacy and data protection issues are the main problems in using web services to transmit data. Three aspects of information security that contains confidentiality, integrity, and availability need to be considered in maintaining web service security. Data sent by data providers can be easily attacked, resulting in data leaks when the data traffic process. We conducted a systematic literature review to present some observation that has been done on web services security. Based on the results, cryptography can be an available security solution. However, this method needs further development if it is applied to RESTful web services which are currently being widely used.

Efficient ultra low-cost solar cells fabricated with green & sustainable push-coated organic active layers

Ayumu Kiyokawa and Varun Vohra

ABSTRACT

Organic solar cells (OSC) active layers fabricated by spin-coating from chlorinated solutions generate large amounts of toxic solvent and costly materials wastes. Here, we investigate an alternative green & sustainable manufacturing, push-coating, which reduces the material and solvent wastes by factors of 40 and 20, respectively. Through a systematic morphological and spectroscopic characterization of the active layers, we found that the differences in drying dynamics between spin-coating and push-coating strongly impact the OSC active layer morphology. In particular, high charge generation efficiencies are achieved in spin-coated active layers while more efficient charge collection occurs in pushcoated ones. These opposite effects compensate each other leading to similar sunlight to electrical power conversion efficiencies (PCEs) in push-coated OSCs compared to spin-coated ones. We demonstrated the versatility of push-coating by fabricating both fullerene and nonfullerene active layers. The highest PCE achieved in our on-going investigation is 5.8 %.

A study on multi-objective evolutionary stage generation using MarioGAN

Ryo Kumagai, Tomoaki Takagi, Keiki Takadama and Hiroyuki Sato

ABSTRACT

This work proposes a method to generate a variety of stages of the Super Mario Bros. with different difficulties by using the MarioGAN and evolutionary algorithm. Feasible solutions are stages that a Mario agent can reach the goal. However, conventional evolutionary algorithms are hard to obtain feasible stages. The proposed method generates stages by genetic operations and the quasi-random numbers in parallel. The experimental results show that the proposed method can obtain a variety of feasible stages.

Camera Identification in Image Forensics

Bonnie Ngai-Fong Law

ABSTRACT

Source camera identification refers to the problem of identifying which camera device has been used to take a particular photo. State-of-the-art techniques use a type of pattern noise called photo-response non-uniformity (PRNU). A major problem with the PRNU-based approach is its sensitivity towards scene content. The identification is poor in areas having low or saturated intensity, or in areas with complex texture. Various methods have been proposed to solve the scene content problem, including a linear regression model for characterizing the scene content artifacts, a weighting scheme using neural network, local variance, and recently the use of the convolutional neural network. In this article, a brief review of these methods is given.

Energy Efficient Temperature Beat Sensor for IoT Based Drought Monitoring Systems

Van Binh Dang and Van Phuc Hoang

ABSTRACT

This paper presents an energy efficient temperature Beat sensor for Internet of Things (IoT) based drought monitoring systems by combining a new technique of temperature Beat sensor with long range (LoRa) communication protocol. With the compact circuit size and the low energy consumption, the proposed sensor can be applied for Internet of Things based smart monitoring systems. The analysis and experimental results have clarified the advantages of the proposed temperature Beat sensor and its potential applications in the real systems.

Wireless Battery Charger for Low Power Devices Using Capacitive Power Transfer Principle

Uthai Borworntamajak and Kamon Jirasereeamornkul

ABSTRACT

Capacitive power transfer (CPT) is one of the technologies in the field of wireless power transfer (WPT). It based on the electric field coupling with many advantages such as low electromagnetic interference (EMI), low eddy current losses, and ability to transfer power through the metal barriers. It can be used in many applications, such as charging mobile phones, laptop, and electric vehicles (EVs) batteries. This paper presents the CPT technology usage in a wireless battery charging by using full bridge inverter and double - sides LLC resonant circuit for maximum transferred power. By designing two transformers for stepping up and down voltage can make coupling impedence to small and adjust impedence of load. The capacitive coupling interface is made of glass as a dielectric which is covered by copper. The input DC inverter delivering power about 100 watts with resonant frequency between 50 to 100 kHz to load. The PSPICE program is used to determine the relative value of circuit parameters on both sides circuit of coupling plates.

INDEX

(By Name)

A		E	
Abdul Waris	15, 16, 17, 18, 1	Edgar Santiago Galicia	13, 14
Agung Budi Sutiono	9	Erdenemaa Nyamdorj	22
Agung Tri Wijayanta	19	Eriyanto Adhi Setyawan	30
Ahmad Imam Rifa'I	19		
Akihiko Nagashima	23	F	
Anni Nuril Hidayati	18	Fadhil Hidayat	30, 21
Arwindra Rizqiawan	4	Ferry Iskandar	17
Asril Pramutadi Andi Mustari	18		
Atsushi Akisawa	12	G	
Ayumu Kiyokawa	31	Guanghao Sun	28
B		H	
Bonnie Ngai-Fong Law	33	Han Trong Thanh	28
Budi Kristiawan	19	Hanavi	21
		Hideo Isshiki	29
C		Hiroki Takahashi	26
Chanon Warisarn	6	Hiroya Ueoka	29
Cici Wulandari	15, 16	Hiroyuki Sato	23, 32, 25
D		I	
Daichi Hagiwara	29	I Gusti Bagus Baskara Nugraha	24
Do Trong Tuan	28	IGB Baskara Nugraha	20
Dodi Budiana	11	Indri Yaningsih	2
Dwi Irwanto	18		

J		R	
Jiang Min	26	Ren Watanabe	12
		Rinaldy Dalimi	11
K		Robi Dany Riupassa	16
Kamon Jirasereeamornkul	5, 35	Ryo Kumagai	32
Keiji Yanai	22	S	
Keiki Takadama	23, 32, 25	Saluky Saluky	20
Kenji Takita	13	Satit Mangkalajan	5
Khairul Basar	16	Shusei Inaba	31
Koichiro Ishibashi	28	Sidik Permana	15
Koji Enoki	12, 13, 14, 19	Sparisoma Viridi	17
Koji Higuchi	5	Suhono Harso Supangkat	20
Kosin Chamnongthai	27	Sunusi Bala Abdullahi	27
L		Swastya Rahastama	17
Luu Manh Ha	28	Syeilendra Pramuditya	15
N		T	
Nguyen Linh Trung	28	Takeru Aoki	23, 25
Novitrian	16	Takuto Kobayashi	12
O		Tomoaki Takagi	32
Okti Nindyati	24	Toshihiko Saiwai	13
P		Toshihiro Zushi	13
Pekik Argo Dahono	4	Tran The Son	10
		U	
		Uthai Borworntamajak	35

V

Van-Binh Dang	34
Van-Phuc Hoang	34
Van-Trung Nguyen	34
Varun Vohra	31

Y

Yazid Bindar	16
Yuki Iwata	28
Yuki Ueda	12
Yumi Matsunaga	31
Yusuke Otomo	12, 13, 14

INDEX (By Last name)

A

Abdullahi Sunusi Bala	27
Akisawa Atsushi	12
Aoki Takeru	23, 25

B

Basar Khairul	16
Bindar Yazid	16
Borworntamajak Uthai	35
Budiana Dodi	11

C

Chamnongthai Kosin	27
--------------------	----

D

Dahono Pekik Argo	4
Dalimi Rinaldy	11
Dang Van-Binh	34

E

Enoki Koji	12, 13, 14, 19
------------	-------------------

G

Galicia Edgar Santiago	13, 14
------------------------	--------

H

Ha Luu Manh	28
Hagiwara Daichi	29
Hanavi	21
Hidayat Fadhil	30, 21
Hidayati Anni Nuril	18
Higuchi Koji	5
Hoang Van-Phuc	34

I

Inaba Shusei	31
Irwanto Dwi	18
Ishibashi Koichiro	28
Iskandar Ferry	17
Isshiki Hideo	29
Iwata Yuki	28

J

Jirasereeamornkul Kamon	5, 35
-------------------------	-------

K

Kiyokawa Ayumu	31
Kobayashi Takuto	12
Kristiawan Budi	19
Kumagai Ryo	32

L

Law Bonnie Ngai-Fong 4

M

Mangkalajan Satit 11

Matsunaga Yumi 1

Min Jiang 34

Mustari Asril Pramutadi Andi 25

N

Nagashima Akihiko 18

Nguyen Van-Trung 3

Nindyati Okti 33

Novitrian 24

Nugraha I Gusti Bagus Baskara 33

Nugraha IGB Baskara 15

Nyamdorj Erdenemaa 17

O

Otomo Yusuke 21, 31, 22

P

Permana Sidik 23

Pramuditya Syeilendra 23

R

Rahastama Swastya 32

Rifa'I Ahmad Imam 26

Riupassa Robi Dany 24

Rizqiawan Arwindra 20

S

Saiwai Toshihiko 31

Saluky Saluky 15

Sato Hiroyuki 23, 32, 25

Setyawan Eriyanto Adhi 30

Son Tran The 10

Sun Guanghao 28

Supangkat Suhono Harso 20

Sutiono Agung Budi 9

T

Takadama Keiki 23, 32, 25

Takagi Tomoaki 32

Takahashi Hiroki 26

Takita Kenji 13

Thanh Han Trong 28

Trung Nguyen Linh 28

Tuan Do Trong 28

U

Ueda Yuki 12

Ueoka Hiroya 29

V

Viridi Sparisoma 17

Vohra Varun 31

W

Waris Abdul 15, 16, 17, 18, 1

Warisarn Chanon 6

Watanabe Ren 12

Wijayanta Agung Tri 19

Wulandari Cici 15, 16

Y

Yanai Keiji 22

Yaningsih Indri 2

Z

Zushi Toshihiro 13