PROCEEDING

ICONETSI

International Conference on Engineering and Information Technology for Sustainable Industry **2022**

21 – 22 September 2022

SGU Alam Sutera Campus, Prominence Tower
Jalan Jalur Sutera Barat No. 15, Tangerang, Indonesia

ICPS
Published by ACM

The Association for Computing Machinery
1601 Broadway, 10th Floor
New York, New York 10019, USA

ACM ISBN: ISBN 978-1-4503-9718-6

MESSAGE FROM RECTOR

The Covid-19 pandemic has substantially posed challenges to the world of a magnitude that we did not specifically anticipate before. On the other hand, it has also opened up new possibilities for technology and innovation in our daily lives and workplaces. In the post-pandemic period that we are experiencing at present, technology and innovation play even bigger roles to improve effectiveness and sufficiency for sustainability on our planet with a particular emphasis on human wellbeing. Despite the size of the task and the current unpredictable path of the world, the transformation to a sustainable future is not impossible because we have the knowledge, tools, and capacity.

Therefore, bringing forward the theme "Fostering Innovation and Technology for the Sustainability of the Post-Pandemic Society", our International Conference on Innovation, Entrepreneurship, and Technology (ICONIET) this year serve as a forum where academics, researchers, industry practitioners, and government officials discuss the significance of innovation, research, and technology in presenting potential solutions for establishing a sustainable future for people and the environment.

For the last seven years, Swiss German University has been regularly conducting the ICONIET as a token of contribution to quality research and education. This year, the ICONIET consists of two sub-conferences, namely "International Conference on Engineering and Information Technology for Sustainable Industry 2022 (ICONETSI)" on 21-22 September 2022 and "International Conference on Biomedical and Pharmaceutical Sciences and Technology (ICOBIPST) on 1 and 2 October 2022.

I'd like to take this opportunity to welcome all honourable speakers, presenters, and participants from Indonesia and other countries. I wish to express my gratitude to the Minister of Communication & Information of the Republic of Indonesia, Mr. Johny G Plate for his tremendous support in this conference. I'd like to further thank the Ministry of Research and Technology as well as the National Research & Innovation Agency (BRIN) for their continuous support of our research. Our deep appreciation also goes to the University of Brawijaya Faculty of Medicine, the co-host of the first ICOBIPST at this conference. Last but surely not the least, I'd like to thank the Committee of ICONIET 2022, including the committee of ICONETSI and ICOBIPST 2022, who have put their utmost efforts into organizing these events.

I wish all participants to experience insightful and productive times in this conference. I hope this event will give invaluable new ideas and potential solutions for establishing a sustainable future in these challenging times. We look forward to seeing all of you at the ICONIET 2022.

Respectfully yours,

Dr. rer. nat. Filiana Santoso
Rector of Swiss German University

MESSAGE FROM CONFERENCE CHAIR

On behalf of the organizing committee, it is my pleasure and privilege to welcome you to the 2nd International Conference on Engineering and Information Technology for Sustainable Industry (ICONETSI 2022).

Under the theme of "Innovation and Technology for Resilient and Sustainable Industry", the conference offers a platform for scholars, engineers, scientists, practitioners, and students from universities and industries around the world to perform knowledge exchanges about research and development activities.

This conference features a rich program, including a keynote speech delivered by honourable Minister of Communication and Informatics Republic of Indonesia - Mr. Johnny G. Plate, and also keynote speech from Dr. R. Herdian – Deputy for Utilization of Research and Innovation BRIN. In the plenary session, the speeches will be delivered by Dr. Nuki Agya Utama - Executive Director at ASEAN Center for Energy and Assoc. Prof. Dr. Waseem Haider from Central Michigan University, while in the parallel session, we are delighted to have Prof. Dr. Dominik Aufderheide from Fachhochschule Südwestfalen, Germany, Prof. Dr.-Ing. Matthias Schirmer from Ernst-Abbe-Hochschule Jena, Germany, Prof. Dr. Wahyudi Sutopo from Lithium Battery Research and Technology Centre, Universitas Sebelas Maret, Surakarta, Indonesia, Dr. Selvakumar Ramachandran from Kerckhoffs Ltd, United Kingdom, and Kholis Abdurachim Audah, Ph.D from Swiss German University; Indonesia

All accepted and presented papers in this conference will have the opportunities to be published in ACM International Conference Proceeding Series and indexed by Scopus. The conference has received 92 submitted papers from Japan, France, Taiwan, Peru, Saudi Arabia, and Indonesia whereby 68 papers have been accepted by the committee for presentation and to be included in the proceedings. Each submission is evaluated by at least three reviewers in a blind review procedure to guarantee the high quality of the articles. Additionally, we thoroughly review each submission's writing style in accordance with the conference proceedings template and the similarity rating to prevent plagiarism.

I would like to express my highest gratitude to every one of the organizing committee members, the reviewers, the moderators, the session chairs, the collaboration partners, the volunteers, and the sponsors for their amazing efforts in making this conference successful.

Thank you for being here with us. We value your presence at this conference. Enjoy the conference!

Warm Regards,
Dr. Eng. Aditya Tirta Pratama
ICONETSI 2022 General Chair

Keynote Speaker

Development and Characterization of Thin Film Metallic Glasses for Biomedical Applications

Assoc. Prof. Dr. Waseem Haider
Central Michigan University, USA

Abstract:

Novel thin film metallic glasses are synthesized for advanced biomedical applications using magnetron co-sputtering. The formation and properties of metallic glasses are optimized via compositional variations using power densities of sputtering gun. These films are subsequently characterized for surface, electrochemical and mechanical properties. The structural characterizations are done using Glancing-angle X-Ray Diffraction, Transmission Electron Microscopy and X-Ray Photoelectron Spectroscopy. Moreover, the electrochemical characterizations are carried out using Potentiodynamic polarization and Impedance spectroscopy. This research offers a new way of synthesizing metallic glasses for advanced applications.

Short Biography:

Dr. Waseem Haider is a tenured associate professor at School of Engineering and Technology, Central Michigan University, USA. He earned his PhD in Mechanical Engineering from Florida International University in 2010. He got a post-doctoral fellowship in materials science and engineering at Pennsylvania State University. Afterwards, he joined orthopedic research labs as a research scientist at State University of New York. Soon after that, he joined University of Texas as tenure track assistant professor where he served for three years. Dr. Haider's research focuses on Materials Science and Biomedical Engineering with special emphasis on Biomedical Materials Surface Chemistry, Electrochemistry, Bulk Metallic Glasses, and Nanomaterials. His research is supported by National Science Foundation and Department of Defense.

Keynote Speaker

Strategic Energy Transition for ASEAN

Dr. Nuki Agya Utama
Executive Director of the ASEAN Centre for Energy (ACE)

Abstract:

The ASEAN economic growth has been one of the fastest in the world, which needs to be fueled by energy. The 6th ASEAN Energy Outlook (AEO6) projected that the primary energy supply in 2040 will be 2.1 times higher than the 2017 level. Still dominated by fossil fuels, ASEAN will become a net importer of gas starting in 2025 and coal starting in 2035—assuming no significant exploration. With the volatility of fossil fuel markets, energy security needs to be addressed in the region's energy transition.

The region, through the ASEAN Plan of Action for Energy Cooperation (APAEC), put energy security as one of its four pillars, along with accessibility, affordability, and sustainability. Within that are the regional energy targets, achieving 23% of RE share in TPES, 35% of RE in installed power capacity, and 32% energy intensity reduction by 2025. Nevertheless, a just energy transition would require ASEAN to secure its energy supply by optimizing the energy mix from the indigenous primary energy sources. The importance of geopolitics, diversification of energy sources, and improvement of capacity and technology are seen to be key strategies.

Short Biography:

Dr. Nuki Agya Utama is appointed as the Executive Director of the ASEAN Centre for Energy (ACE) and reporting directly to an International organisation under ASEAN entities and reporting to Governing Council consist of ministries energy in ASEAN member states. He is currently an advisory board member of Asia Pacific Energy Research Centre (APERC) and World Economic Forum (WEF) Global Future Councils.

Dr. Nuki Agya Utama has academics and research background as Post-Doctorate in Graduate School Energy Science Kyoto University for energy scenario planning in South East Asia. Holding PhD, with research on Life Cycle Energy Analysis from Joint Graduate School of Energy and Environment, the University of Technology King Mongkut (KMUTT), Thailand.

Prior to assuming his position in ACE, he worked as a director various local companies and as a consultant in a well-known international Institutions. In his early career, he worked as a consultant in UNDP and UNEP, working on energy and environment-related issues. He also serves as an invited lecture in Diponegoro University as well as editor and reviewer in a various international journal.

Invited Speaker

The Indonesian Natural Products Library: an Indonesian Natural Products Database for Drug Discovery

Kholis Abdurachim Audah, PhD.
Director of Academic Research and Community Service
Swiss German University

Abstract:

Indonesia is one of megabiodiverse countries in the world which has abundant natural resources both on land and marine. Natural resources have been utilized as the resources for traditional medicines that have been practices for generations. The term natural product refers to natural resource, mainly biota, that has medicinal benefits. Various researches on natural products have been vigorously conducted in Indonesia, especially since 2015 when the Indonesian government launched a National Research Plan (2015-2044). In this plan, research on natural products had become country's top research priority. Despite this positive atmosphere for natural products researches, researches conducted are still scattered and lack of coordination, communication or collaboration among researchers and or institutions. One of the problems to this condition is due to the absence of a common database platform for scientist to display their works. The platform can be used as the source of information so that people can follow and learn about different research that have been conducted, on what areas and the stage of the researches.

The Indonesian Natural Products Library (INPL) is developed to solve this problem to ensure that all researches utilizing Indonesian biodiversity, particularly in the area of drug discovery or pharmaceuticals, are more effectively done. As the source of information, INPL will enable the synchronizing and synergizing Indonesia's natural products-based research so that unnecessary activities such as overlapping and discontinuation of researches can be avoided. In addition, INPL will also be useful for finding alternatives for other areas such as food and energy sources.

Short Biography:

Dr. Audah earned his PhD in Biochemistry from Auburn University, USA (2007). He did his Postdoctoral Research at Yale University School of Medicine, Section of Infectious Diseases (2009). Dr. Kholis Audah earned his Bachelor Degree in Chemistry/

Biochemistry from Bogor Agricultural University, Indonesia (1996) and a Master Degree in Molecular Biology from University of Malaya, Malaysia (2000). Currently, he serves as the Director of Research and Community Services and Senior Lecturer at Department

of Biomedical Engineering, Swiss German University (SGU), Tangerang (2015-present). Before joining SGU, he held different positions at different institutions in Indonesia, Saudi Arabia and USA.

His current researches focus on Drug Discovery on antibacterial and anticancer from Indonesian natural products as well as synthetic compounds and Telemedicine. His project in Development of Mangrove Extract Library for Drug Discovery and Development of Microscope Scanner for Telepathology were funded by the Ministry of Research and Higher Education, Republic of Indonesia. He also obtained international and industrial funding as well as Awards from various institutions. He is the inventor of the Indonesian Natural Products Library (INPL) and the Citizen Medicine (CitMed) databases.

Dr. Audah is actively involved in different scientific organizations and scientific activities as Editor in Chief, Editorial Board Members and Reviewer in several national and international journals. Before joining SGU, Dr Audah was the Head of Biochemistry Departments and Laboratory and Assistant Professor at the College of Medicine, University of Hail, Hail, Saudi Arabia. He was also the Lead Scientist (Research and Laboratory) for the establishment of the Indonesia Medical Education and Research Institute (IMERI), Faculty of Medicine, University of Indonesia. He earned some professional certifications such as Good Clinical Practice from the Indonesian Association for the Study of Medicinal, Certified Reviewer from Kemenristekdikti and ISO 17024 and Certified Biosafety Level 2 and Radioisotope handling, Yale University.

Invited Speaker

Therapeutic Potential of Organic Fermented Soybean Extract Against Lead (Pb)-Induced Zebrafish Via NMR Metabolomics Approach

Assoc. Prof. Dr. Intan Safinar Ismail
Dean of Faculty of Science, University of Putra Malaysia

Abstract:

Lead (Pb), even in small quantity, is harmful to multiple body systems. Dimercaptosuccinic acid (DMSA), one of the chelators that used to treat Pb toxicity also gives various negative side effects. Tempeh, one of the fermented soybeans is known having high antioxidant effect which might potentially be useful in alleviation of Pb toxicity. Organic foods are sold with a higher price than the non-organics as the organics are claimed to be better in terms of health benefits. However, the difference in the phytochemical content between organic and non-organic soybeans that related to their quali-ties is not well explored. Thus, this study assessed the therapeutic potential of organic fermented soybean extracts (FSE) against Pb toxicity using a zebrafish model. Non-targeted NMR metabolomics was used to study the difference in the chemical profiles between non-organic and organic soy-beans (Glycine max [L.] Merr.), and the metabolite changes after fermentation using Rhizopus oligosporus. The Pb and FSE concentrations were preliminary investigated before proceeding further with the therapeutic study of FSE against Pb toxicity in zebrafish model. All zebrafish samples were evaluated using NMR metabolomics with additional support behavioral test and transmission electron microscope (TEM) analysis. Zebrafish that exposed to 50 mg/L FSE significantly changed four metabolites namely glucose, isoleucine, sn-glycero-3-phosphocholine, and glutamine. Preliminarily study of Pb inducement significantly altered the behavior of zebrafish and non-lethal 5 mg/L Pb concentration which altered the metabolite profiles of zebrafish are selected for further investigation. In the therapeutic study, citrulline was significantly upregulated only in Pb-induced group without any treatment.

FSE-treated (50mg/L) Pb-induced zebrafish might potentially retrieve the effect of Pb toxicity by significantly upregulated four key differential metabolites (glutamine, glutamate, glutathione, and taurine). Even though the treatment groups (FSE and DMSA) did not normalize to control, yet they differ from Pb-induced group without any treatment. These results presumed that FSE has potential to ameliorate the Pb poisoning effect in this fish model.

Short Biography:

Associate Professor Dr. Intan Safinar Ismail completed her PhD and post-doctoral studies at Okayama University and Hoshi Medical University, Japan. She joined Universiti Putra Malaysia (UPM) in 2005 and became the Head of Laboratory of Natural Products at the Institute of Bioscience in 2011 until 2017. She is now the Head of Chemistry Department, Faculty of Science. Within the period of her affliation to the Universiti Putra Malaysia, she has published more than 190 papers in reputed journals and presentations at conferences as speakers including keynote and invited at international meetings. She led 14 research projects and leading 2 at the moment and more than 5 as a co-worker. Seven Ph.D. and 13 MSc students have graduated under her supervision, with 3 Ph.D. and 1 MSc students are currently enrolling. She co-supervised more than 50 postgraduates. She is editor for a few journals including Journal of Natural Medicines (Springer), review editor for Marine Biotechnology (Frontiers) and Specialty Section of Natural Products (Frontiers).

Invited Speaker

Current Challenges of the Energy Market - Between Net Zero Scenario and Security of Energy Supply

Prof. Dr.-Ing Matthias Schirmer
EAH Jena, Germany

Abstract:

With the adoption of the climate targets, the European energy market is facing a fundamental transformation. Fossil energy sources must be replaced by low-emission, renewable types of energy production. In the field of electricity generation, some successes have been achieved in the last decade. The share of renewable energies in electricity generation in the EU-27 was 22% last year. Greenhouse gas emissions have been reduced by 32% since 1990. These successes should not obscure the challenges that lie ahead, especially in the heat supply and mobility sectors. The war in Ukraine has further aggravated this situation. In addition to the goal of reducing emissions, the main concern now is to secure the energy supply. This raises the question of how to reduce dependence on Russian oil and gas supplies. Furthermore, how can we deal with energy prices, which have risen drastically in some cases? In the following, the current situation of the European energy market will be analyzed, and possible solutions discussed.

Short Biography:

Prof. Dr.-Ing. Matthias Schirmer is Professor for Energy and Environment (W2) at the Faculty of Industrial Engineering at the University of Applied Science Jena, Germany. He is currently a Vice- Dean of the Faculty Industrial Engineering and Director of the post graduate study program “Environmental and Geo resource Management”. Prof. Dr.-Ing. Matthias Schirmer has academics and research background as PhD thesis (Dr.-Ing.) Dresden University of Technology, with research on Waste characterization and energy generation by waste and biomass, and also Energy systems modelling and simulation. He has experienced in various teaching, research and project stays in Portugal, Greece, Peru, Chile, Ecuador, Indonesia, Vietnam, Thailand, India, Namibia and South Africa.

Invited Speaker:

Emerging Technologies for ALL

Dr. Selvakumar Ramachandran
Kerckhoffs Ltd, UK

Abstract:

In human history 'technological' revolutions brought in a greater level of playing field for society. It has not just created opportunities and created wealth, but it strengthened the connectivity, human bonding even stronger. Given the advancement in telecommunications, particularly 5G combined with VR/AR, innovators and researchers believe that it can bring a greater level of inclusion and accessibility in several domains. We, at Kerckhoffs Ltd, creating Eyemmersive - an inclusive VR-based tourism platform for all, connecting VR-content creators to the people who want to have alternative platform to have parallel tourism and a tool to plan before they travel. Dr Ramachandran will speak about VR in accessible tourism and how it can support inclusion in other domains

Short Biography:

Dr Selvakumar Ramachandran is the CEO of UK based software R & D company Kerckhoffs Ltd. Dr Ramachandran is one of the pioneers in the field of emerging technologies and a flag bearer promoting technology for all. Dr Ramachandran earned his PhD from University of Rome – Tor Vergata, Italy and he received his MSc degree from Blekinge Tekniska Hogskola, Sweden. Dr Ramachandran has for 20+ years of experience in the field of computer science, published several papers and was a recipient of Google Scholar award in the year 2012.

Invited Speaker:

Intelligent Systems and Strategies for a Sustainable Cement Manufacturing

Prof. Dr.-Ing. Dominik Aufderheide
Fachhochschule Südwestfalen, Germany

Abstract:

Approximately 4-8% of the total global emissions of carbon dioxide (CO2) are caused by the usage of concrete. Here, especially the process of cement manufacturing is very energy intensive and the usage of large amounts of fossil fuels is typically involved within the main clinkering process. Therefore, the usage of Alternative Fuel Resources (AFR) has become a main technique towards a greener cement production. Due to the volatile combustion characteristics of those bulk materials, the process control has become a challenge for plant operators. This talk provides an overview of recent methodologies for the optimization of cement plants in order to reduce the associated environmental impact. In this context, especially intelligent system architectures and model-based optimization techniques are introduced and discussed. Furthermore, the incorporation of sensors and vison-based approaches for a model-based process optimization are evaluated.

Short Biography:

Prof. Dr. Dominik Aufderheide is a full professor for industrially metrology at the Faculty of Electrical Engineering at the South Westphalia University of Applied Sciences. His research interests are intelligent sensor systems, computer vision, model-based design and optimisation techniques and energy optimization. Before he returned to academia in 2020, he worked for several years as the head of automation and research at the Di Matteo Group in Beckum, Germany, where he led several development and research projects related to the process optimization in energy-intensive industries, such as cement and steel production or in electrical power plants. He graduated in 2014 from the University of Bolton, U.K. as a Ph.D. with a dissertation about the self-acting 3D scene reconstruction based on a novel sensor-fusion approach. At the same university, he received his Master's degree in Electronic Systems and Engineering Management with Distinction in 2009. Before that he studied Electrical Engineering and Industrial Informatics at the South Westphalia University of Applied Sciences in Soest, Germany.

Invited Speaker 4:

Accelerating A Commercialization of The Innovation Technology Using Early Supply Chain and Standardization:

A Case Study of Energy Storage Technology

Prof. Dr. Ir. Wahyudi Sutopo, ST., M.Si, IPM.
Universitas Sebelas Maret

Abstract:

In most cases, many technology products resulting from research happened to fail to be launched to the market due to the valley of death. This obstacle usually occurs in the transition process between technology development and technology commercialization. Hence, critical action is needed to accelerate the technology commercialization to ensure the commercialization potency of research output does not fall into the valley of death. The innovation of the Electric Motorcycle Swap Battery (EMSB) technology encourages the formation of a new ecosystem at the early of the supply chain, including technopreneurs and startups from manufacturers, suppliers, and distributors for commercialization. Swappable Batteries (SB), Electric Motorcycle (EM), and Battery Swap/Charging Station (BSCS) are key components of EMSB that have attracted the attention of supply chain players and government to find a thriving solution to enable faster adoption and diffusion of EMSB in Indonesia. Previously, the Center of Excellence for Electrical Energy Storage Technology, Universitas Sebelas Maret (or CoE-EEST UNS) has developed SB, EM, and BSCS prototypes with limited systems to operate the EMSB. However, to transfer technological innovations and/or facilitate operations of the EMSB on a large scale, there are various challenges and problems with products, processes, innovations, and businesses that are required to be solved. There are five interventions/models that were proposed by CoE-EEST UNS, namely circular business for EMSB, innovation diffusion and adoption, technology readiness and economic benefits prediction, location-allocation for smart charging, and Internet of Things based decision support system for distributing EMSB, and the technical requirements for interoperable of EMSB. The interventions/models are seen as alternatives to accelerate the downstream of EMSB technology innovation, and then maximize the economic benefits of a green economy in Indonesia

Short Biography:

Wahyudi Sutopo is a professor in industrial engineering and Head of Industrial Engineering and Techno-Economics Research Group, Department of Industrial Engineering, Universitas Sebelas Maret (UNS), Surakarta, Indonesia. He is also as researcher for center of excellence for electrical energy storage technology (CoE-EEST), the president of the industrial engineering and operations management (IEOM) society for Indonesia's professional chapter, and Director, IEOM Asia Pacific Operation. His

educational background is the profession of engineer from UNS (2018); Doctor and Bachelor in industrial engineering from Institut Teknologi Bandung (2011 & 1999); and master of management science from Universitas Indonesia (2004). His research interests include supply chain engineering, engineering economy & cost analysis, and technology innovation & commercialization.

Dr Sutopo has completed research projects with more than 45 grants and carried out research projects funded by Institution of Research and Community Services - UNS, Ministry of Research and Technology / National Agency for Research and Technology, Indonesia Endowment Fund for Educational (LPDP), PT Pertamina (Persero), PT Toyota Motor Manufacturing Indonesia, and various other companies. He has written 4 text books and 7-chapter books and made 5 intellectual property rights (IPR) in the form of copyrights, and 3 patents. He has initiated to commercialize research outputs of UCE-EEST UNS related to energy storage technology and electric vehicle conversion through start-ups where he is one of the founders, namely PT Batex Energi Mandiri and PT. Ekoelektrik Konversi Mandiri. Dr Sutopo has published articles over 185 documents indexed by scopus with H-index 13. His email address is wahyudisutopo@staff.uns.ac.id.

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The 1st International Conference on Engineering and Information Technology for Sustainable Industry.

(ICONETSI 2020)

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