



ICEED 2022

The 6th International Conference on
Eco Engineering Development (ICEED 2022)

PROGRAM BOOK

Jakarta, November 16-17, 2022

Faculty of Engineering

Bina Nusantara University



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WELCOMING REMARKS

Rector BINUS University



Distinguished keynote speakers,
Fellow professors and presenters,
Ladies and gentlemen,

It is a great honor for me to welcome you to The 6th International Conference on Eco Engineering Development (ICEED), hosted by Faculty of Engineering, BINUS University.

BINUS University's vision 2035 has underlined the clear message of fostering and empowering society in building and serving the nation. We realize that contribution of research, publication, and commercialization of research products is very important in achieving the vision.

This conference serves as a platform for the development of a research and innovation ecosystem that will promote digital transformation. This conference is also part of continuing efforts in creating and disseminating knowledge as well as creating research and industry partnerships among faculty members, industry representatives, and distinguished scholars from all over the world.

Ladies and gentlemen,

I would like to express my highest appreciation to all invited keynote speakers and invited plenary session speakers, and all presenters and participants who will make this conference meaningful. I strongly advise making use of this conference wisely, not only discussing research but also trying to build new joint research, publication, faculty exchanges, and so on.

Finally, I also thank all the chairperson and committee members of the conference. I wish all of you a great conference and make new acquaintances during the conferences.

Thank you very much.

Jakarta, 17 November 2022

Prof. Dr. Ir. Harjanto Prabowo, MM
Rector, BINUS University





WELCOMING REMARKS

General Chair

BINUS Joint International Conference (BJIC) 2022



The 6th International Conference on Eco Engineering Development (ICEED)

H.E. Prof. Dr. Ir. Harjanto Prabowo, MM., Rector, BINUS University
Vice rectors, Directors, Deans, and Professors,
Distinguished Keynote speaker, guests, ladies, and gentlemen,

Let us praise to God the Almighty for His merciful and blessings as we gather here to attend the 6th International Conference on Eco Engineering Development (ICEED) 2022 as part of BINUS Joint International Conference (BJIC) 2022.

This year BJIC consists of 5 international conferences covering many disciplines ranging from sustainability and development, information management, engineering, technology, computer science, business, international relations, social science, and humanities, namely:

1. **International Conference on Biospheric Harmony Advanced Research (ICOBAR)**, chaired by Elioenai Sitepu, S.T., M.Sc., Ph.D., was held in Jakarta, 22 - 23 June 2022.
2. **International Conference on Information Management and Technology (ICIMTech)**, chaired by Dr. Erwin Halim, M.M., M.B.A., was held in Semarang, 11-12 August 2022;
3. **International Conference on Business, International Relations and Diplomacy (ICOBIRD)**, chaired by Dr. Lili Yulyadi, was held in Jakarta from 13-14 October 2022;
4. **International Conference on Eco Engineering Development (ICEED)**, chaired by Dr. Suryadi, M.Eng., is held now in Jakarta, 16 – 17 November 2022;
5. **International Conference on Computer Science and Computational Intelligence (ICCSICI)**, chaired by Dr. Abdul Haris Rangkuti, will be held in Bandung from 17 – 18 November 2022.

BJIC has been an integrated effort to enhance the research and publication productivity of the faculty member since September 2018. As a commitment to support research and innovation ecosystem, this year we innovate by engaging industry closer to the academia and vice versa. An Industrial forum is the first step to commercializing the research product of the faculty members and getting ideas and feedback from the industry pertaining to specific needs of the industry and society.

The 6th ICEED, specifically, aims to bring together researchers, engineers, scientists, and experts to not only share their ideas, but also disseminate their knowledge and research on achieving comprehensive and immaculate eco-engineering. ICEED 2022 would focus on the research, analysis, and resolution on environmental development through innovative technology, green infrastructure, planning, and design; delivered through the keynote speakers and distinguished lecturers.





Distinguished guests, ladies, and gentlemen,

This conference is also very special, because our keynote speakers are prominent scholars and professionals from Taiwan (Prof. Dr. Chin-Kun Wang), Canada (Assoc. Prof. Dr. Agus Pulung Sasmito), Brunei Darussalam (Assoc. Prof. SMN Arosha Senanayake, PhD), Saudi Arabia (Ardian Nengkoda, Ph.D) and Indonesia (Prof. Dr. Eng. Made Suangga) who contribute to the discussion of new insights about eco-engineering from their perspective as academicians, professionals, and experts from different fields. This conference shows the bold commitment of BINUS University as a world-class university in creating high-impact research towards BINUS Vision 2035 and in continuously producing, sharing knowledge, and fostering and empowering the society. Therefore, I do appreciate their contribution to these conferences.

Last but not least, I would like to appreciate all chairpersons of the 5 conferences and committee members who have been working very hard to make this conference possible. I would also like to thank presenters, participants, our reviewers, and publishers of the papers presented in the conferences as well as the sponsor of this event. I hope you enjoy the conference!

Thank you abundantly.

Jakarta, 16 November 2022

Prof. Dr. Tirta N. Mursitama, PhD
General Chair BJIC 2022





WELCOMING REMARKS

Dean of Faculty of Engineering



H.E. Prof. Dr. Ir. Harjanto Prabowo, Rector BINUS University
Prof. Dr. Tirta Nugraha Mursitama, Ph.D,
Vice Rector in Research and Technology Transfer, BINUS University
All of keynote speakers, all participants, ladies and gentlemen

Good morning, everyone.

Let us first pray to our Merciful God and thank our Almighty God for all His mercies and blessings that have enabled us to come together today in this webinar conference. Welcome to the 6th International Conference on Eco-Engineering and Development (ICEED) 2022. Welcome to the Faculty of Engineering at Bina Nusantara University. It is a great pleasure to have you all at this conference.

Today, the Faculty of Engineering BINUS University is hosting ICEED 2022. This conference brings together academicians, experts, scientists, practitioners, and students with the spirit of disseminating and sharing their ideas and knowledge on related topics. I believe that the contribution papers from the keynote speaker and authors at this conference will come out with the most effective approaches and strategies to synergize human society with its natural environment in a way that benefits both. This annual conference is also the manifestation of our commitment to take part in fostering and empowering society through innovation, technology, and eco-engineering development. We hope the implementation of research results will improve the quality of human life and environment.

Finally, I would like to express my gratitude to everyone, the committee members, who made this seminar possible and successful. To our keynote speakers, all presenters, all our distinguished guests, and all participants, thank you for being here. Welcome and enjoy the conference.

Jakarta, 15 November 2022

Dr. Ir. Nina Nurdiani, S.T., M.T.

Dean of Faculty of Engineering
Bina Nusantara University





WELCOMING REMARKS

Chair of ICEED 2022

The rector of Bina Nusantara University, Prof. Dr. Harjanto Prabowo,
Vice Rector, Prof. Tirta Nugraha Mursitama,
Distinguish keynote speakers,
Presenters, and All participants.

Very good morning.

On behalf of organizing committee of the 6th International Conference on Eco-Engineering Development, ICEED 2022, it is my great honor and pleasure to have the opportunity to deliver this opening message today.

To begin, I would like to express my warmest welcome and thank our distinguished keynote speakers as well as all presenters of the ICEED 2022. Furthermore, I would like to convey my sincere gratitude to the committee, reviewers, and all people for their endeavor to support this event.

As it is known, ICEED 2022 is held in a virtual format by the Faculty of Engineering, Bina Nusantara University, with the theme of "Towards eco-future engineering: research, analysis, and resolution on environmental development through innovative technology, green infrastructure, planning, and design." The primary goal of this conference is to promote research and development activities as well as a scientific information exchange among researchers, developers, engineers, students, and practitioners all around the world. We believe that this event will not only allow the participants to gain their current knowledge of science and technology, however, this ICEED will also benefit as a starting point to build a broad network, which in turn will facilitate any potential collaboration to attain the mission of immaculate eco-engineering development. So, let us make all sessions and discussions fruitful and enjoyable.

Distinguished speaker, presenters, ladies, and gentlemen,

The ICEED 2022 offered two different scopes of topics of interest. The topic of interest-1 consists of sustainable infrastructure management and technology, eco-architecture planning and design, and innovative food technology. The topic of interest-2 includes smart computing and communication, smart architecture, and smart industry. From all these scopes, ICEED 2022 received 329 submitted research papers. Through the double-blind peer-review process, the committee carefully selected 197 research papers that will be presented at this conference.

After completing the conference and all revision processes, the committee will submit the full papers, with topics of interest-1 going to IOP-EES and topics of interest-2 going to Springer-LNEE. These publishers will perform quality checks on the submitted papers, and only those that pass these checks will be published. Therefore, in my capacity as conference chair, I wish that all presenters and authors will give their best efforts to refine their papers for a successful future publication with the IOP-EES and Springer-LNEE Conference Proceedings.





Distinguished speaker, presenters, ladies, and gentlemen,

This conference will be held over two days, with the first day reserved only for the invited speakers and the second day used for the parallel sessions for each presenter. So, I would like to take this opportunity to remind all of our speakers and moderators to stick to the schedule and prevent any sessions from running over time.

Finally, once again, thank you for your invaluable contribution and participation in the success of this event. Have a great experience at this virtual conference with Bina Nusantara University.

Thank you very much.

Jakarta, 16 November 2022

Dr. Suryadi, M.Eng.
Chair of the ICEED 2022
Bina Nusantara University





Keynote Speaker 1

Decarbonization in mine energy system using green technologies

Agus P. Sasmito, Ph.D.

Associate Professor Department of Mining and Materials Engineering McGill University,

Montreal Quebec Canada

Abstract

There is a significant increase in the production of Coal, Lithium, Nickel and Gold. This increased production is triggered by the transformation of energy usage for vehicles. That is fossil fuels to electricity. And the key minerals for the electric vehicles (EV) battery are nickel and lithium. Regarding the production, there are steps in obtaining mineral commodities. They are: (1) To find places where ores occur, (2) To learn whether ore can be extracted economically, (3) To extract ore from ground, (4) To separate ore minerals from other mined rock. (Mill), (5) To extract pure commodity from the ore mineral, (6) To carry commodity to market and (7) To Find buyers and sell the commodity. And in terms of challenges, they are climate, technology and innovation, operational cost and productivity, the uncertainty of the demand and skill gap. The climate challenges can be overcome by decarbonization. The advantages are no carbon emission, saving in ventilation by reducing air duty and the CFM can be reduced by 50% and also less heating and cooling. So that, the rise of ventilation is smaller or less CAPEX. The visions of the mine of future in operation could use only one control room that equipped with online process information from the rock, then no human presence in the production area and fully decarbonized and environmentally friendly mine. The use of renewable energy is also attractive in the mining production in the future.





Keynote Speaker 2

Empowering the community to overcome COVID-19 pandemic in Taiwan and the science - an example of electrolyzed water

Chin-Kun Wang

Dr. & Prof., Former President, Chung Shan Medical University, Taiwan

Abstract

Serve Acute Respiratory Syndrome coronavirus 2 (SARS-CoV2) outbreak from the December 2019 in China has brought over 220 million infected cases and caused over 4.55 millions of death. COVID-19 pandemic till now destroy the human health, communication and economics, uncountable loss and huge influence greatly impact this world. In the past period, many cities were locked down in most countries. The status significantly change the lifestyle and business condition. Available alert systems for the prevention of COVID-19 infection are very critical for a country and reduce the threat to life. Fortunately, Taiwan empowers the management and control of immigration to stop the outbreak of COVID-19 effectively. No lock down or any influence for this society until the middle of May 2021. A missing point from the flight crews brought a wave of local transmission on 15th May. The highest infected cases were 550 per day (total population of Taiwan is 23 million). Fortunately, this outbreak is well controlled under the self-awareness of all citizens, wearing face mask, sanitary behavior promotion (proper cleaning and washing hands), vaccination, and quick and correct pandemic investigation and proper isolation successfully reduce the infected cases to 1-3 per day in two months. Till today, 16103 infected cases and 839 cases are found (15th September). From the past experience, community empowering is very important to prevent the outbreak and continuous transmission of COVID-19. From the science viewpoint, except vaccine, some technology materials could show great potential on this pandemic. Electrolyzed water (EW) is a new type of cleaning and disinfecting agent obtained by electrolysis with dilute sodium chloride solution, it has low cost and harm to the human body and is also environmentally friendly. The anode produces acid electrolyzed water (AEW) and is mainly used to inhibit bacterial growth and disinfect. The cathode provides basic electrolyzed water (BEW), which is implemented to clean the surface of objects. EW is a powerful multifunctional antibacterial agent with a wide range of applications in the medicine, agriculture, and food industry. Studies in vitro and in vivo show that it has an inhibitory effect on pathogenic bacteria and viruses. Therefore, EW is used for the prevention of chronic diseases, and in recent years it has been discovered can be used to against infectious viruses. Not only animal experiments, but also clinical trials have also obtained more and more relevant research results, such as accelerating wound healing, oral health care, anti-obesity, lowering blood sugar, anti-cancer and anti-infectious viral diseases, etc. This chapter will summarize the application of EW in treating bacteria, viruses and the prevention of infectious and chronic diseases.

Key words: SARS-COV2, COVID-19 pandemic, community, electrolyzed water





Keynote Speaker 3

Green Economy: Technology Challenges & Way Forward

Dr. Ardian Nengkoda

Abstract

The green technology that supporting economy in principle is an alternative economy solution that more promising to achieve sustainable growth, development environmental and social wellbeing. For the past decade, green economy is becoming “buzz words” however recently facing challenges due to pandemic, energy security issues, higher oil, gas, energy price including inflation and geopolitics. With current dynamic situation across global, it is uncertain to predict how to increase green economy in the future. The overall objective of this presentation is to discuss a number of challenges encountered including technology readiness. Some important remaining variables that hinder the growth of green economics and infrastructures are limitations in financial model and human resources, weak regulatory frameworks, lack of enforcement mechanisms, and economic infrastructure (technology). Green economy model, current technology trend and circular economy example will be discussed in particular to answer how the model can generate economic development and improvements in people’s lives in ways consistent with advancing also environmental and social well-being. One significant component of a green economy strategy is to promote the development and adoption of sustainable technologies however policy, financial, human resources, impact analysis are most importantly can’t be ignored.





Keynote Speaker 4

Understanding carbon emissions of infrastructure projects - The important role of engineers in reaching net zero

Prof. Dr. Eng. Made Suangga

Abstract

The Net Zero Emission (NZE) program became a popular term after the 2015 Paris Climate Agreement. The program aims to reduce environmental pollution that has the potential to cause global warming. Net zero emissions or zero carbon emissions is a condition where the amount of carbon emissions released into the atmosphere does not exceed the number of emissions that can be absorbed by the earth. To achieve it is necessary a transition from energy systems in use today to clean energy systems to achieve balance between human activities and the balance of nature.

The government Indonesia is very serious in realizing its net zero emission (NZE) commitment by 2060 and if possible, faster than that. Therefore, the government of Indonesia is preparing a roadmap for realize the Net Zero Emission to face various challenges and risks of climate change in the future.

The global construction industry is believed to be responsible for 39% of global greenhouse gas emissions. Because of that, there is a need for awareness of carbon emission from the engineers involved in the construction industry to reduce or minimize carbon emissions as much as possible from their construction projects.

Therefore, determination of the amount of *embodied* carbon from each construction project need to be determined before and become one of the considerations in decision making. Embodied carbon is the carbon dioxide (CO₂) emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure.

The characteristic of Construction Project is very specific *and* different from one project to another project. The amount of *embodied* carbon during construction depends on the location and characteristics of the construction project. For Road and Bridge Projects in Indonesia, Ministry of Public Work and Housing has established the standard pay item and unit price analyzes for the project under the Ministry of Public Work and Housing. It can be used as the basis for calculating the amount of *Embodied* Carbon of the projects.





Keynote Speaker 5

Hybrid Intuition: Human on the way back & Human in the loop

[Robotics, hybrid intuition & clouds lead the way to digital technology enlightenment: Smart Citizen]

SM Namal Aroscha Senanayake, Senior Member/IEEE

Abstract

Goal: The synergy of soft Bio-Inspired Rehabilitation Devices (sBIRD) and hybrid intuition using information fusion as a novel technology leads the way to Smart Citizen.

Existing artificial intelligent technologies are based on historical data and training models which suffer from low efficiency in knowledge accumulation, difficulty in reusing cross-domain knowledge and low credibility where data is open and reliance on human experience, hence intuition is strong. There is an urgent need to develop hybrid *intuition (human on the way back & human in in the loop)* technologies to make up the lack of human intellectual brain power and reduce human resource dependence.

Hybrid intuition solutions aims to develop evolving sBIRD using artificial intelligent-enabled cloud technologies for hybrid augmented intelligence: knowledge evolution, knowledge migration & collaborative decision-making and development of cross-domain collaborative decision-making systems, leading to innovative methods for complex adaptive tasks and support for a new generation of artificial intelligence (AI). As far as AI can co-exist parallel and distributed to natural intelligence in hybrid associative memories, the enlightenment of digital technologies shall be achieved by introducing the following three key novel technologies using Smart Society 5.0 and Industry Revolution 4.0:

- ✓ Human-machine collaborative knowledge evolution

For human-machine knowledge solidification, design knowledge discovery methods to provide explainable laws for humans; design cognitive computing models to introduce human implicit knowledge into machines, so that humans and machines can learn from each other, therefore, iterate and upgrade.

- ✓ Cross-disciplinary knowledge transfer

In response to the inconsistent representation of cross domain knowledge, a generic framework for migration learning is constructed for behavioral semantic extraction and characterization techniques to achieve cross-domain knowledge sharing and data-driven service framework/architecture.

- ✓ Hybrid Enhanced Intelligent Collaborative Decision Making

In view of the uncertainty of complex adaptive tasks and the multiplicity of value judgments, multi-grain task decomposition and human-machine allocation methods are designed to build a dynamic decision-making model for human-machine collaborative decision-making.





Organizing committee

Advisory

Prof. Dr. Ir. Harjanto Prabowo, M.M.
The Rector of Bina Nusantara University.

Prof. Dr. Tirta Nugraha Mursitama, Ph.D.
Vice Rector of Research and Technology Transfer, Bina Nusantara University.

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ICEED 2022

The 6th International Conference on Eco Engineering Development

Jakarta, 16-17 November 2022 (Virtual Conference)

Secretariat: Faculty of Engineering, BINUS University

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THE GENERAL SCHEDULE

16 November 2022

Time	Agenda
08:00-08:10	Registration
08:10-08:15	Opening The ICEED 2022 Seminar by MC
08.15-08.18	Indonesia National Anthem “Indonesia Raya”
08.18-08.20	Opening Prayer
08.20-08.30	Opening Speech1 : Rector of BINUS University (Prof. Dr. Ir. Harjanto Prabowo, M.M)
08.30-08.40	Opening Speech2: Vice Rector for Research and Technology Transfer (Prof. Tirta Nugraha Mursitama, S.Sos., M.M., Ph.D.)
08.40-08.45	Performance
08.40-08.45	Opening Speech3 Dean of Faculty of Engineering (Dr. Ir. Nina Nurdiani, S.T. M.T.)
08.45-08.50	Opening Speech3 Chairman ICEED 2022 (Dr. Suryadi, M.Eng)
08:50-09:00	Photo Session
09:00-09:40	Keynote Speaker Assoc. Prof. Dr. Agus Pulung Sasmito
09:40-09:55	Q&A session
09.55-10:00	Photo Session and Certificate Awarding
10:00-10:40	Keynote Speaker Prof. Dr. Chin-Kun Wang
10:40-10:55	Q&A session
10.55-11:00	Photo Session and Certificate Awarding
11:00-11:40	Keynote Speaker Ardian Nengkoda, PhD.
11:40-11:55	Q&A Session
11.55-12:00	Photo Session and Certificate Awarding
12:00-13:00	Break
13:00-13:40	Keynote Speaker Prof. Dr. Eng. Made Suangga
13:40-13:55	Q&A Session
13.55-14:00	Photo Session and Certificate Awarding
14:00-14:40	Keynote Speaker Assoc. Prof. SMN Aroscha Senanayake, PhD.
14:40-14:55	Q&A session
14.55-15:00	Photo Session n Certificate Awarding
15:00-15:30	Closing





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17 November 2022

Time	Agenda
08:00-08:15	Registration
08:15-08:30	Opening
08:30-12:00	Parallel Session
12:00-13:00	Break
13:00-15:00	Parallel Session
15:00-15:15	Announcement
15.15-15.25	Photo Session
15.25-15.30	Closing

