



ICEF2026

The 5th International Conference on Electrical
Facilities and information technologies 2026

*Next Generation Advanced Electric Facility
and Information Technology*



August 18(TUE) - 21 (FRI), 2026



Chiang Mai University, Thailand

Organized by



THE KOREAN INSTITUTE OF
ELECTRICAL ENGINEERS

Co-Organized by



ENGINEERING



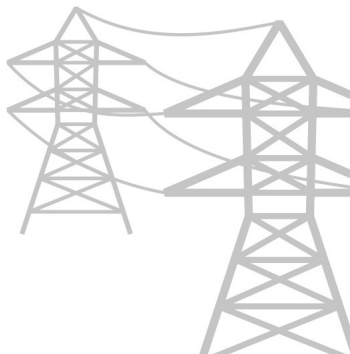
HANBAT NATIONAL UNIVERSITY



KOREA NATIONAL UNIVERSITY
OF TRANSPORTATION



Korea Railroad
Research Institute



Contents

Welcome Message	1
Committee	2
Conference Topics	4
Venue	6
Program at a Glance	7
Social Programs	11
Online & Offline Assistance	14
Keynote, Oral Presentation	16
How The Session Will Go	19
Keynote Sessions	20
Oral Sessions	
Oral Session 1	40
Oral Session 2	41
Oral Session 3	42
Poster Sessions	
Poster Session 1	43
Poster Session 2	47



Welcome Message



Dear Attendees,

On behalf of the Korean Institute of Electrical Engineers (KIEE) and the ICEF2026 Organizing Committee, it is my great pleasure to welcome you to the International Conference on Electrical Facilities and Information Technologies 2026 (ICEF2026), which will be held from August 18 to 21, 2026, at Chiang Mai University, Thailand.

ICEF2026 aims to bring together distinguished academics, researchers, industry professionals, and students from around the world to share recent advances, exchange ideas, and explore future directions in the fields of electrical facilities and information technologies.

This conference is hosted and organized by the Korean Institute of Electrical Engineers (KIEE), and co-organized by Chiang Mai University, Hanbat National University, and Korea National University of Transportation. This strong international collaboration reflects our shared commitment to fostering global dialogue and innovation across disciplines.

Chiang Mai, renowned for its rich cultural heritage, historic temples, and beautiful natural landscapes, provides an inspiring setting for both academic exchange and networking. We believe that this unique environment will offer participants a rewarding and memorable experience.

The conference program will feature keynote speeches by leading experts, technical sessions, poster presentations, and interactive discussions. In addition, various networking opportunities and social events will be arranged to encourage meaningful connections and long-term collaboration among participants.

We sincerely appreciate the dedication and support of all organizers, partners, and participants who contribute to making ICEF2026 a successful and impactful event.

We warmly invite you to join us in Chiang Mai and look forward to welcoming you to ICEF2026 for an enriching and unforgettable experience.

Warmest regards,

Hyungchul Kim, Ph.D. / P.E.

*Chair, ICEF2026 Organizing Committee
Organized by KIEE – Electrical Facilities Society*



■ CONFERENCE HONORARY CHAIRMAN

Assoc. Prof. Sermsak Uatrongjit (Chiang Mai University, Thailand)

■ CONFERENCE CHAIR

Hyungchul Kim (President of KIEE EF (KRRI, Korea))

■ CONFERENCE CO-CHAIR

Asst. Prof. Watcharin Srirattanawichaikul (Chiang Mai University, Thailand)

■ ORGANIZING CHAIRS

Jeong-Won Kang (Korea National University of Transportation, Korea)

Nguyễn Nhở (HCMUT, Vietnam)

Assoc. Prof. Paramet Wirasanti (Chiang Mai University, Thailand)

■ PROGRAM CHAIRS

Wonseok Choi (Hanbat National University, Korea)

Juhee Choi (Sangmyung University, Korea)

Seungkwon Shin (Korea Railroad Research Institute, Korea)

Prof. Chatchawan Chaichana (Chiang Mai University, Thailand)

Assoc. Prof. Doldet Tantraviwat (Chiang Mai University, Thailand)

■ INTERNATIONAL TECHNICAL AND SCIENTIFIC PROGRAM CHAIRS

Prof. Aydogan Ozdemir (Kadir Has University, Istanbul-Turkey)

Prof. Assel Mukasheva (Kazakh-British Technical University, Kazakhstan)

Prof. Taehyung Kim (University of Michigan-Dearborn, USA)

■ FINANCIAL CHAIRS

Jongnam Kim (YSFS Co., Ltd, Korea)

Donha Whang (KERI, Korea)

■ AWARD CHAIRS

Young Park (Hanbat National University, Korea)

Taekue Kim (Changwon National University, Korea)

Asst. Prof. Witsarut Achariyaviriya (Chiang Mai University, Thailand)

■ PUBLICATION CHAIRS

Wonsik Moon (Soongsil University, Korea)

Gyujung Cho (Pai Chai University, Korea)

Yongho Yoon (Gwangju University, Korea)

Hoseong Jeong (Korea Railroad Research Institute, Korea)

Jeonghwan Gwak (Korea National University of Transportation, Korea)

Assoc. Prof. Sirote Khunkitti (Chiang Mai University, Thailand)

■ LOCAL Secretary

Mr. Sangpil Lee (KIEE, Korea)

Mr. Rattalanna Mingchuea (Chiang Mai University, Thailand)



■ Session 1 : Future Electric Facility Planning and Operations

- Power Distribution Network Modeling, Analysis and Control
- HVDC, MVDC & LVDC: Design, Control and Protection
- AC-DC Hybrid Grid Operation, Control and Protection
- IoT (Internet Of Thing)
- Electrical Safety : Design, Control and Protection
- Electric Machinery and Drives
- Energy Storage Systems, Renewable Energy

■ Session 2 : Smart Electric Facility

- Smart Grids, Micro-grid, and Utility Applications
- Smart Materials and Devices, Media Facade and Large Format Display
- Illuminating Design and Light Installation
- Electrical Installation Design and Construction Technology
- Technical Specification for Electrical Installation
- Converge Technique for Electric Facility

■ Session 3 : Information Communication Technology

- Software System & Engineering
- Artificial Intelligence
- Communications and Networking
- Embedded System, IoT/Edge Computing
- VR/AR, Metaverse
- Data Science, Big Data, Database, Data Mining
- Cyber Security

■ Session 4 : Intelligent Transportation Technology

- Railway System & Technology
- Intelligent Transportation System
- Smart Automobile Technology
- Road Operation Technology
- Aircraft System and Control Technology

■ Session 5 : Mechanical & Environment System

- Material Synthesis and Processing
- Mechatronics & Robotics
- Mechanical System
- Smart Energy Management for Home, Building and Factory
- 3D Printing, Digital Twin
- Environment System

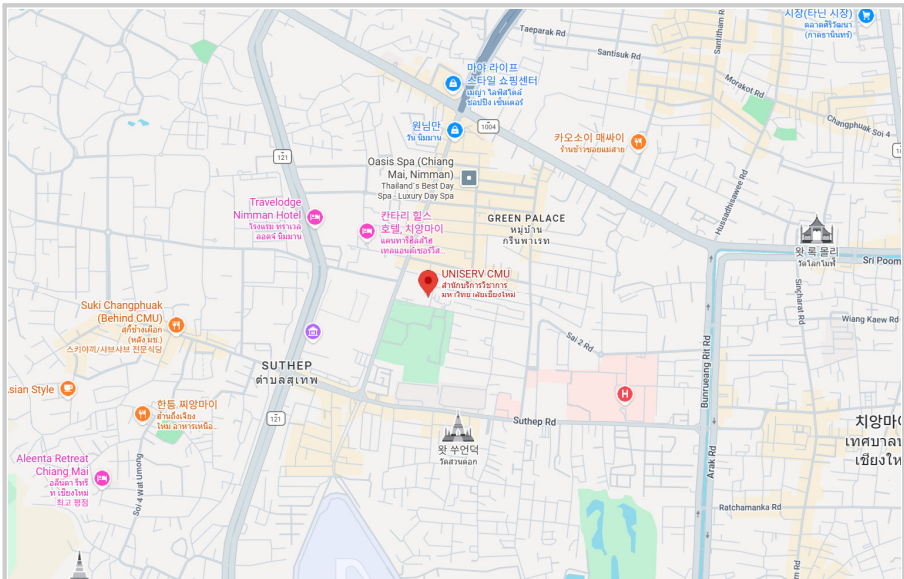
■ Session 6 : Building Integrated Photovoltaic System

- Solar cells & modules
- BIPV system design and construction
- Power conversion, optimization, simulation
- New and renewable energy grid connection
- Building Information Modeling (BIM)
- Sensors and monitoring systems
- PV system operation & maintenance



UNISERV CMU

MAP



Address

239 Nimmanahaeminda Road, Tambon Su Thep, Mueang Chiang Mai District, Chiang Mai 50200 Thailand

Tel

Phone (+66) 53 942 881

E-mail

uniserv@cmu.ac.th





Program at a Glance

1st Day

August 18 (Tue)

Time		Place : UNISERV CMU (Chiang Mai University) Room (Main Conference Hall)
PM	13:00~16:00	■ Special Session
	15:00~	■ Registration (UNISERV)
	16:00~18:00	■ Preliminary Discussion for Special Session Organizer
	18:00~20:00	Welcome Reception (UNISERV)

Place Information



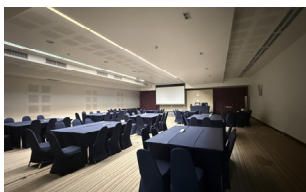
Main Conference Hall



Registration Desk



[Oral Session 1]



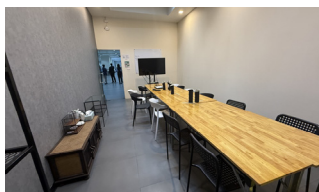
Room 1

[Oral Session 2]



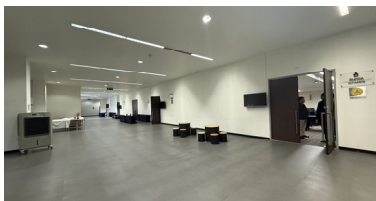
Room 2

[Oral Session 3]



Room 3

[Poster Session]



Corridor



A0 size



Lunch Restaurant



Program at a Glance

2nd Day

August 19 (Wed)

Time		Place : UNISERV CMU (Chiang Mai University)			Organizer / Chair
		Room (Main Conference Hall)			
AM	09:00~	■ Registration			
	09:00~09:30	■ Keynote Session 1 : Prof. Hyunjoong Kim <i>(Hanbat National University, Korea)</i>			Sang Yeol Choi (Korea)
	09:30~10:00	■ Keynote Session 2 : Prof. Jeonghwan Gwak <i>(Korea National University of Transportation, Korea)</i>			Jaemoon Kim (Korea)
	10:00~10:30	■ Keynote Session 3 : Prof. Joondong Kim <i>(Incheon National University, Korea)</i>			Jeong Won Kang (Korea)
	10:30~10:40	Coffee Break			
	10:40~11:10	■ Keynote Session 4 : Prof. Chatchawan Chaichana <i>(Chiang Mai Univ., Thailand)</i>			Dongsu Kim (Korea)
	11:10~11:40	■ Keynote Session 5 : Prof. Nipon Theera-Umpon <i>(Chiang Mai Univ., Thailand)</i>			Chatchawan Chaichana (Thailand)
	11:40~12:10	■ Keynote Session 6 : Prof. Young Park <i>(Hanbat National University, Korea)</i>			Chulmin Park (Korea)
	12:10~12:30	■ Opening Ceremony - Opening Speech: Dr. Hyungchul Kim <i>(KRRRI, Korea)</i> - Welcome Speech: Prof. Sermsak Uatrongjit <i>(Chiang Mai Univ., Thailand)</i>			
	12:30~13:30	Lunch			
PM	13:30~14:50	■ Poster Session 1 (Conference Hall Corridor)			
	14:50~15:00	Coffee Break			
	Room	Room 1	Room 2	Room 3	
	15:00~17:00	■ Oral Session 1 Future Electrics	■ Oral Session 2 Artificial Intelligence	■ Oral Session 3 BIM & Related Technologies	



Program at a Glance

3rd Day

August 20 (Thu)

Time		Place : UNISERV CMU (Chiang Mai University)	Organizer / Chair
		Room (Main Conference Hall)	
AM	09:00~	■ Registration	
	10:00~10:30	■ Keynote Session 7 : Dr. Zhanna Suimenbayeva <i>(Mukhametzhan Tynyshpayev ALT University, Kazakhstan)</i>	Hagwone Kim (Korea)
	10:30~11:00	■ Keynote Session 8 : Prof. Nguyễn Nhỏ <i>(Ho Chi Minh City University of Technology, Vietnam)</i>	
	11:00~11:20	Coffee Break	
	11:20~11:50	■ Keynote Session 9 : Prof. Assel Mukasheva <i>(Kazakh-British Technical University, Kazakhstan)</i>	Seungkwon Shin (Korea)
	11:50~12:20	■ Keynote Session 10 : Prof. Aydogan Ozdemir <i>(Kadir Has University, Turkey)</i>	
	12:20~13:30	Lunch	
PM	13:30~15:00	Coffee & Snack	
	15:00~16:30	■ Poster Session 2 (Conference Hall Corridor)	
	17:00~19:00	Banquet “Kantary Hills Hotel, Chiang Mai”	

■ Banquet Place Information : “Kantary Hills Hotel, Chiang Mai”



44/1-4 Nimmanahaeminda Road Nimmanhaemin Tambon Su Thep, Amphoe Mueang Chiang Mai, Chang Wat Chiang Mai 50200, Thailand



Program at a Glance

4th Day

August 21 (FRI)

Time		Place : UNISERV CMU (Chiang Mai University)
		Room (Main Conference Hall)
AM	09:00~10:00	■ Special Session (1): Electric Facility Workshop Korea-Thailand Industrial Exchange Technical Forum (1)
	10:00~11:00	■ Special Session (2): Intelligent Railway & Transportation Workshop Korea-Thailand Industrial Exchange Technical Forum (2)
	11:00~12:00	■ Special Session (3): Intelligent Science & Open Source Workshop Korea-Thailand Industrial Exchange Technical Forum (3)
	12:00~14:00	Closing



Social Programs

Welcome Reception

August 18 (TUE) 18:00~20:00

Main Conference Hall

On the first day of the conference, please join to know each other!

Opening Ceremony

August 19 (WED) 10:40~11:00

Main Conference Hall

■ Opening Speech

- Dr. Hyungchul Kim (ICEF 2026 Chairman, Korea)

■ Welcome Speech

- Prof. Sermasak Uatrungjit (Chiang Mai Univ., Thailand)

Keynote session

August 19 (Wed) ~ August 20 (Thu)

Room (Main Conference Hall)

August 19 (Wed)	09:00~ 09:30	■ Keynote Session 1 Power System Stability Challenges Arising from Renewable Energy Expansion and the Role of Inverter-Based Resources Prof. Hyunjoong Kim (<i>Hanbat National University, Korea</i>)
	09:30~ 10:00	■ Keynote Session 2 Foundation Models for Trustworthy, Data-Efficient Engineering Intelligence in Electrical Facilities and Information Technologies Prof. Jeonghwan Gwak (<i>Korea National University of Transportation, Korea</i>)
	10:00~ 10:30	■ Keynote Session 3 Transparent Energy Production and Applications Prof. Joondong Kim (<i>Incheon National University, Korea</i>)
	10:40~ 11:10	■ Keynote Session 4 Challenges in Electricity Load Monitoring Using Non-Intrusive Load Monitoring (NILM): A Field Experience with PowerLens at the ESIE Hub Building, Chiang Mai University Prof. Chatchawan Chaichana (<i>Chiang Mai University, Thailand</i>)
	11:10~ 11:40	■ Keynote Session 5 Classical AI in Biomedicine Prof. Nipon Theera-Umporn (<i>Chiang Mai University, Thailand</i>)
	11:40~ 12:10	■ Keynote Session 6 Transition Strategies for Condition-Based Maintenance in Korean Electric Railway Prof. Young Park (<i>Hanbat National University, Korea</i>)
August 20 (Thu)	10:00~ 10:30	■ Keynote Session 7 Kazakhstan Railways 2050: Digital Transformation and Development of International Transport Corridors Dr. Zhanna Suimenbayeva (<i>Mukhametzhan Tynyshpayev ALT University, Kazakhstan</i>)
	10:30~ 11:00	■ Keynote Session 8 A Progressive SVPWM Research for Four-Level Inverters — Reducing Common-Mode Voltage, Harmonic Distortion, and Switching Loss Prof. Nguyễn Nhữ (<i>Ho Chi Minh City University of Technology, Vietnam</i>)
	11:20~ 11:50	■ Keynote Session 9 Visual Monitoring and Image Analysis for Sustainable Agriculture: A Review Prof. Assel Mukasheva (<i>Kazakh-British Technical University, Kazakhstan</i>)
	11:50~ 12:20	■ Keynote Session 10 Next-Generation Resilient Rail Electrification: Integrating Storage, Renewables, and Intelligence Prof. Aydogan Ozdemir (<i>Kadir Has University, Turkey</i>)

Special session

August 21 (Fri)

August 21 (Fri)	09:00~ 10:00	■ Special Session (1): Electric Facility Workshop Korea-Thailand Industrial Exchange Technical Forum (1)	Main Conference Hall
	10:00~ 11:00	■ Special Session (2): Intelligent Railway & Transportation Workshop Korea-Thailand Industrial Exchange Technical Forum (2)	Main Conference Hall
	11:00~ 12:00	■ Special Session (3): Intelligent Science & Open Source Workshop Korea-Thailand Industrial Exchange Technical Forum (3)	Main Conference Hall

Oral Session

August 19 (Wed)

August 19 (Wed)	15:00~ 17:00	■ Oral Session 1 : Future Electrics Topic 1: Future Electric Facility Planning and Operations	Room 1
	15:00~ 17:20	■ Oral Session 2 : Artificial Intelligence Topic 3: Information Communication Technology	Room 2
	15:00~ 16:20	■ Oral Session 3 : BIM & Related Technologies Topic 5: Mechanical & Environment System Topic 6: Building Integrated Photovoltaic System	Room 3

Poster Session

August 19 (Wed)~20 (Thu) / Room (Conference Hall Corridor)

DATE		Session	Conference Topics Session
August 19 (Wed)	13:30~ 14:50	Poster Session 1	■ Topic 1: Future Electric Facility Planning and Operations ■ Topic 2: Smart Electric Facility ■ Topic 3: Information Communication Technology ■ Topic 4: Intelligent Transportation Technology
August 20 (Thu)	15:00~ 16:30	Poster Session 2	■ Topic 4: Intelligent Transportation Technology ■ Topic 5: Mechanical & Environment System ■ Topic 6: Building Integrated Photovoltaic System ■ ETC



■ Registration Desk | Lobby

- August 18 (TUE) ~ August 20 (THU) 09:00~18:00
- Lobby, Main Conference Hall,

■ Registration Fee Covers [On-Site]

- [Early]
 - Regular USD 600 / KRW 850,000
 - Student USD 400 / KRW 550,000
- [Early-Virtual]
 - Regular USD 300 / KRW 420,000
 - Student USD 200 / KRW 260,000
- [On-Site]
 - Regular USD 800 / KRW 1,100,000
 - Student USD 500 / KRW 670,000
- [On-Site-Virtual]
 - Regular USD 400 / KRW 550,000
 - Student USD 300 / KRW 420,000
- [CIS countries & Developing countries]
 - Regular/Student Regular On-LINE Attendance USD 50
 - Keynote Sessions, Conference Kit

■ Personal Envelope

1. Name Badge
2. Program Book
3. Souvenir

■ Coffee Break

- August 19 (WED) 10:30~10:40 / 14:50~15:00
- August 20 (THU) 11:00~11:20 / 13:30~15:00

Fresh coffee, tea and refreshments will be served during the break times.

■ DOWNLOAD MATERIALS

You can download your materials at my page or virtual website

■ How do I access the online session?

- Only participants who have completed
- Registration can access the ICEF 2026(www.icef2026.org)
- Virtual website. Please use the official
- Website login information (ID/PW).

■ What are the technical requirements needed to participate in the ICEF 2026

You need an Internet connection and web browser. For the best viewing experience, we recommend that you join the conference using a supported internet browser, which includes Google Chrome, Firefox and Safari.



Opening Ceremony, Keynote & Oral Session [on - site/online]

August 19 (Wed)		
Room	Live Sessions Access Link (Zoom Link)	QR code
Main Conference Hall AM 09:00~12:30	https://us06web.zoom.us/j/81569530674?pwd=LhNigzJzqfeMYVWaWESUPvEfVXPcdk.1	 ID : 815 6953 0674 PW : 716351
Room 1 PM 15:00~17:00	https://us06web.zoom.us/j/81569530674?pwd=LhNigzJzqfeMYVWaWESUPvEfVXPcdk.1	 ID : 815 6953 0674 PW : 716351
Room 2 PM 15:00~17:20	https://us06web.zoom.us/j/88133358565?pwd=acFYy0usabUkM6CHUVFaozrgUyyToM.1	 ID : 881 3335 8565 PW : 555223
Room 3 PM 15:00~16:20	https://us06web.zoom.us/j/86972372345?pwd=VoKcZegKufFWzoo8ISU6zz9fZ58WlP.1	 ID : 869 7237 2345 PW : 866693

■ Keynote Session [on - site/online]

August 20 (Thu)		
Room	Live Sessions Access Link (Zoom Link)	QR code
Main Conference Hall AM 10:00~12:20	https://us06web.zoom.us/j/89939289564?pwd=QdJ2e47wFSjyFtNPL42mNt462G5N5E.1	 ID : 899 3928 9564 PW : 079137

■ Poster Session [on - site/online]

August 19 (Wed)		
Room	Live Sessions Access Link (Zoom Link)	QR code
Conference Hall Corridor Poster Session 1 19 (Wed) PM 13:30~14:50	https://us06web.zoom.us/j/81569530674?pwd=LhniGzJzqfeMYVWaWESUPvEfVXPcdk.1	 ID : 815 6953 0674 PW : 716351
	https://us06web.zoom.us/j/88133358565?pwd=acFYy0usabUkM6CHUVFaozrgUyyToM.1	 ID : 881 3335 8565 PW : 555223
	https://us06web.zoom.us/j/86972372345?pwd=VokCZegKufFWzoo8ISU6zz9fZ58WlP.1	 ID : 869 7237 2345 PW : 866693

August 20 (Thu)		
Room	Live Sessions Access Link (Zoom Link)	QR code
Conference Hall Corridor Poster Session 2 20 (Thu) PM 15:00~16:30	https://us06web.zoom.us/j/89939289564?pwd=QdJ2e47wFSjyFINPL42mNt462G5N5E.1	 ID : 899 3928 9564 PW : 079137
	https://us06web.zoom.us/j/87370836178?pwd=kDzT7EtEGLjfloBABTPxSkZxjl70a0.1	 ID : 873 7083 6178 PW : 167328
	https://us06web.zoom.us/j/84475894830?pwd=GrhCAAJuUoEH2bcrLzMOAv0QfvYLM0.1	 ID : 844 7589 4830 PW : 685984



How The Session Will Go

Oral Session

- Presentation time: 15 minutes Presentation + 5 minutes Live Q&A
- Make sure your presentation materials do not have compatibility issues beforehand.
- Given the Zoom live streaming, please arrive in the session room at least 15 minutes before the session.
- Submit your file to the staff of each presentation room before session starts.
- Presentations are to be done on - site

Poster Session

- Poster authors should print, bring and post the posters at the designated spot for on - site availability. [A0 Size or A1 Size]
- Please make sure to stand by your poster during your assigned presentation time.
- Q&As will be made live on - site and via virtual website with comments and email.
- All posters will be posted on both platforms (online/offline) simultaneously during the conference dates.



09:00~09:30

Wed. August 19, 2026

Room : Main Conference Hall

Prof. Hyunjoong Kim
(Hanbat National University, Korea)



Power System Stability Challenges Arising from Renewable Energy Expansion and the Role of Inverter-Based Resources

Abstract

The rapid expansion of renewable energy and inverter-based resources (IBRs) is weakening conventional sources of inertia, reactive power, and short-circuit strength supplied by synchronous generators. This study investigates how an inertia service market can be designed for Korea as PV, wind, and energy storage become stability resources. It reviews stability problems, including curtailment, reduced frequency-control capability, and voltage-security risks, and compares international market reforms. The United Kingdom's Stability and Voltage Markets demonstrate long-, mid-, and short-term procurement of inertia, dynamic voltage support, short-circuit level, and reactive power. Australia's Essential System Services show how regulation, contingency reserve, and RoCoF control can be integrated with market operation. These cases indicate that Korea needs TSO-DSO-VPP coordination, qualification for grid-forming converters, and settlement rules that reward stability provision.

The framework models inertia from synchronous generators, PV, wind, and ESS using swing-equation-based or synthetic-response formulations. A system-wide inertia constraint is embedded in a stochastic unit commitment model reflecting renewable uncertainty, reserve requirements, and Korean grid characteristics. Simulations use the KPG 193 synthetic Korean power-system test network under renewable penetration

scenarios. The results show that inertia-aware operation commits additional synchronous units during low net-load periods, satisfies minimum inertia requirements, and improves RoCoF by 26 percent after a 1,000 MW generation outage, although frequency-nadir improvement remains limited.

The study compares marginal pricing, average incremental pricing, and approximated convex hull pricing (aCHP) for energy, reserve, and inertia settlement. Marginal pricing fails to produce an inertia signal because inertia constraints are discrete and often non-binding, while AIP can require uplift or opportunity-cost compensation. In contrast, aCHP reflects no-load and start-up costs, yields stronger inertia prices, reduces uplift payments, and provides clearer incentives for synchronous and renewable resources. The findings suggest that Korea's stability market should combine technical requirements with pricing mechanisms that sustain investment in IBR-enabled inertia support.

Biography

- Ph.D. Electrical Engineering(Mar. 2017 – Aug. 2023)
Seoul National University, Seoul, South Korea
Dissertation title: “Allocating Causality-based Network Service Charges in P2P Electricity Trading for Cost-Efficient Power System Operation: System Loss and Violation Charges”
Advisor: Professor Yong Tae (Philip) Yoon
- Bachelor of Electrical Engineering (Mar. 2008 – Feb. 2016)
Seoul National University, Seoul, South Korea
- Postdoctoral research scientist (Sep. 2023 – Feb. 2024)
Electric Grid Optimization Laboratory
Korea Institute of Energy Technology, Naju-si, South Korea Mar. 2017 – Aug. 2023
- Research Professor (Mar. 2024 – Present)
Intelligent Electrical Safety Convergence Project Organization
Korea Institute of Energy Technology, Naju-si, South Korea



09:30~10:00

Wed. August 19, 2026

Room : Main Conference Hall

Prof. Jeonghwan Gwak
(Korea National University of Transportation, Korea)



Foundation Models for Trustworthy, Data-Efficient Engineering Intelligence in Electrical Facilities and Information Technologies

Abstract

This lecture discusses a research direction for developing foundation-model-based engineering intelligence that can be reliably used in real-world technical environments. Rather than treating foundation models as off-the-shelf solutions, the lecture focuses on how large-scale vision, language, and multimodal models can be adapted, validated, and deployed for domain-specific applications in electrical facilities, AIoT-enabled infrastructure, medical and industrial imaging, visual surveillance, and information-technology systems.

Engineering data differ substantially from the open-domain data on which most general-purpose AI models are trained. Electrical facilities and connected infrastructures generate heterogeneous multimodal data, including inspection images and videos, thermal images, vibration and acoustic signals, sensor streams, maintenance records, fault logs, device-level network data, and expert reports. These data are often limited in scale, imbalanced, noisy, privacy-sensitive, and strongly affected by site-specific operating conditions. For this reason, high benchmark performance alone is not sufficient for engineering deployment. Models must remain reliable under distribution shift, limited supervision, safety constraints, and edge-computing limitations.

A key perspective of the lecture is that foundation models can serve as reusable scientific priors for engineering applications. Their pretrained representations may

provide useful prior knowledge when labeled data are scarce or expensive to obtain. This is particularly relevant to rare-fault diagnosis, anomaly detection, facility inspection, and medical or industrial image analysis, where collecting representative annotations is difficult. In this context, data-efficient learning methods such as zero-shot, few-shot, weakly supervised, and sub-one-shot learning become important tools for translating general-purpose AI into specialized engineering intelligence.

The lecture also examines how domain knowledge can be incorporated into foundation models without full-scale retraining. Parameter-efficient adaptation methods, including adapter modules, low-rank adaptation, prompt learning, retrieval-augmented grounding, feature distillation, and lightweight task-specific heads, offer practical ways to specialize large models while controlling computational cost. Such approaches are especially important in AIoT and edge environments, where memory, latency, communication cost, energy consumption, and hardware constraints must be considered together with predictive accuracy.

Trustworthiness is another central issue in deploying AI for engineering systems. In safety-relevant applications, AI models must provide not only predictions but also calibrated confidence, interpretable evidence, and mechanisms for human oversight. Topics such as uncertainty estimation, Bayesian calibration, out-of-distribution detection, robustness to sensor noise and domain shift, explainable visual evidence, human-in-the-loop validation, and model-governance procedures are therefore essential. These elements become particularly important when AI systems support predictive maintenance, anomaly alarms, inspection prioritization, clinical or industrial imaging, and surveillance-related decision processes.

The lecture proposes a domain-specialized foundation-model pipeline for engineering intelligence. This pipeline connects multimodal data curation, privacy-aware representation learning, foundation-model distillation, parameter-efficient adaptation, calibrated inference with uncertainty and evidence maps, and continual learning from newly collected field data. The goal is to bridge recent advances in foundation models with the practical requirements of robust, deployable, and maintainable engineering systems. By viewing foundation models as adaptable AI infrastructures rather than isolated large neural networks, this lecture highlights their potential role in engineering problem solving under limited data, changing environments, and high reliability requirements. The discussion points toward future research on domain-specific benchmarks, data-efficient inspection models, edge-deployable foundation models, and safety-aware AI systems for electrical facilities and information-technology infrastructures.

Biography

Jeonghwan Gwak (Senior Member, IEEE) is a Full Professor in the Department of Software at Korea National University of Transportation, Republic of Korea, and the Director of the Algorithmic Machine Intelligence Laboratory. He received the Ph.D. degree in machine learning and artificial intelligence from the Gwangju Institute of Science and Technology (GIST), Gwangju, Korea, in 2014.

Before joining Korea National University of Transportation, he worked as a researcher and chief technician in industry and research institutes, and later held research positions at GIST and Seoul National University Hospital. From 2014 to 2016, he was a postdoctoral researcher at GIST, followed by a research professor appointment from 2016 to 2017. From 2017 to 2019, he served as a research professor at the Biomedical Research Institute and the Department of Radiology, Seoul National University Hospital. He joined Korea National University of Transportation in 2019 as an Assistant Professor, was promoted to Associate Professor in 2021, and became a Full Professor in 2024.

His research interests include deep learning, computer vision, image and video processing, large language models, AIoT, fuzzy systems, evolutionary algorithms, optimization, and their applications in biomedical, transportation, railway, and industrial systems



Keynote Session 3

10:00~10:30

Wed. August 19, 2026

Room : Main Conference Hall

Prof. Joondong Kim
(Incheon National University, Korea)

Transparent Energy Production and Applications

Abstract

The growing demand for sustainable and eco-friendly energy solutions has accelerated research in transparent energy technologies. These systems enable the generation or harvesting of energy without obstructing visibility, offering innovative applications in building-integrated photovoltaics, smart windows, and wearable electronics. In this study, we present the development and performance analysis of a transparent energy device based on advanced materials with high optical transmittance and efficient energy conversion capabilities. The fabricated device maintains excellent transparency while delivering significant energy output, demonstrating strong potential for integration into everyday surfaces such as glass façades and mobile displays. These findings highlight the promising future of transparent energy systems as a core technology for next-generation smart cities and zero-energy buildings.

Owing to the advantages of transparency and self-powered functionality, transparent photovoltaic (TPV) devices offer expanded opportunities for diverse applications, such as smart power transfer, healthcare and sustainable bio-electronic systems.

We can find other routes for TPV energy harvesting from the water. Underwater photovoltaics represent a promising avenue for enabling self-powered systems in marine sensing, communication, and exploration. In this study, we demonstrate a water-enhanced transparent photovoltaic (TPV) module based on a wide-bandgap heterojunc-

tion, designed for efficient underwater power generation and optical transparency. The surrounding water medium functions as an optical concentrator, enhancing light coupling and expanding angular light collection. This work introduces a novel underwater power window with tunable water-layer interaction, offering a sustainable and efficient energy solution for submerged applications.

Biography

Joondong Kim is a dean at College of Engineering and a professor in the Department of Electrical Engineering at Incheon National University in Korea. He got his Ph.D. in 2006 from State University of New York at Buffalo and MS in 2001 from Rensselaer Polytechnic Institute, NY, USA. He has research topics on energy devices (transparent photovoltaics and hydrogen generator), sensors, bioinspired electronics and functional designs. He published + 350 SCI papers and holds + 100 patents. - Commendation (Invention Award), Minister of Science and Technology Information and Communication (STIC) and + 5 National Awards.



Keynote Session 4

10:40~11:10

Wed. August 19, 2026

Room : Main Conference Hall

Prof. Chatchawan Chaichana
(Chiang Mai University, Thailand)



Challenges in Electricity Load Monitoring Using Non-Intrusive Load Monitoring (NILM): A Field Experience with Power Lens at the ESIE Hub Building, Chiang Mai University

Abstract

Accurate appliance-level energy monitoring is a prerequisite for effective building energy management, yet deploying individual sub-meters across every electrical load remains prohibitively costly and disruptive for most commercial buildings. Non-Intrusive Load Monitoring (NILM) offers a cost-effective alternative by inferring per-appliance power consumption from a single measurement point. While NILM has been extensively studied under laboratory and temperate-climate conditions, real-world deployment in commercial buildings operating in tropical climates exposes a distinct set of technical and practical challenges that remain insufficiently documented in the literature.

This talk reports field experience from deploying PowerLens — a custom-designed NILM sensing system developed at the Faculty of Engineering, Chiang Mai University — at the ESIE Hub building on the CMU campus. The PowerLens device acquires three-phase voltage and current waveforms at a sampling rate of ≥ 1 kHz across six measurement channels (three voltage, three current) at 16-bit resolution, with energy measurement accuracy of $\leq \pm 3\%$. Raw signals are processed through a Raspberry Pi Pico 2W main controller, relayed via an ESP32-WROOM-32U module to the cloud, and disaggregated using a deep learning pipeline on AWS EC2/SageMaker.

The ESIE Hub presents a representative commercial load environment dominated by twelve inverter-type split air conditioner units totalling 20.41 kW — a configuration that directly confronts the most persistent challenge in tropical NILM: the concurrent operation of multiple inverter ACs. Unlike fixed-speed units with clear ON/OFF transients, inverter ACs produce continuously varying power output with rich harmonic content, causing overlapping electrical signatures that degrade disaggregation accuracy. Compounding this, tropical conditions sustain near-continuous AC operation throughout the day, reducing the idle periods typically exploited for appliance baseline estimation.

This talk discusses how these challenges were encountered, quantified, and partially addressed through hardware design choices, feature engineering, and model architecture, and identifies open problems that current NILM algorithms have yet to resolve for real-world tropical commercial deployments.

Biography

Chatchawan Chaichana is working at the Department of Mechanical Engineering at Chiang Mai University, Thailand. He received his B.Eng. in Mechanical Engineering from Chiang Mai University in 1993, his M.Eng. in Development Technology from the University of Melbourne, Australia, in 1999, and his Ph.D. in Engineering from the University of Melbourne in 2003. He is a Research Fellow at Mie University, Japan, and a member of ASHRAE and the Engineering Institute of Thailand. His research interests encompass energy efficiency, renewable energy technologies, smart agriculture, and the application of image processing and machine learning for industrial and environmental monitoring. He has contributed to energy efficiency guidelines for Thailand's Ministry of Energy, led international research projects funded by APEC, the Toyota Foundation, and JASTIP, and has supervised more than 30 Master's and Ph.D. graduates. He has authored over 60 peer-reviewed journal articles spanning energy systems, controlled-environment agriculture, thermoelectric devices, and sustainable resource management.



Keynote Session 5

11:10~11:40

Wed. August 19, 2026

Room : Main Conference Hall

Prof. Nipon Theera-Umpon
(Chiang Mai University, Thailand)



Classical AI in Biomedicine

Abstract

Artificial intelligence (AI) has been applied in a wide range of fields, including military, medicine, science, engineering, economics, etc. Deep learning has become particularly well known and widely adopted in recent years due to its powerful performance and relatively straightforward implementation, albeit with ongoing concerns regarding its generalizability and substantial computational resource requirements. Meanwhile, classical AI approaches, which rely more heavily on human expertise and domain knowledge, still deserve considerable attention. This presentation provides a brief overview of digital technology, biological intelligence, and artificial intelligence. It also introduces research conducted at the Computational Intelligence (CI) Research Laboratory, Chiang Mai University. Particular emphasis is placed on biomedical and healthcare applications developed at the CI Lab. We have successfully applied classical AI and CI techniques to address several real-world biomedical and healthcare problems, demonstrating that effective AI solutions do not always require deep learning.

Keywords: Artificial Intelligence, Computational Intelligence, Biomedical Applications, Health Technology, Medical Image and Signal Processing, Pattern Recognition

Biography

Nipon Theera-Umpon received his B.Eng. (Hons.) degree from Chiang Mai University, Thailand, M.S. degree from University of Southern California, U.S.A., and Ph.D. degree from the University of Missouri-Columbia, U.S.A., all in Electrical Engineering. He was a postdoctoral fellow in Computer Engineering and Computer Science at the University of Missouri-Columbia. In 1993, he joined as a lecturer at the Department of Electrical Engineering, Chiang Mai University, where he is now a full-professor. He has served as editor, reviewer, general chair, technical chair and committee member for several journals and conferences. He has been bestowed several royal decorations and won several awards including National Outstanding Researcher Award (2026) and National Outstanding Government Official Award (2015), to name a few. He had served as the director of Biomedical Engineering Institute, Chiang Mai University, from 2017 to 2025. He was associate dean of Engineering, chairman for graduate study in electrical engineering, and chairman for graduate study in biomedical engineering. He is a member of Thai Robotics Society, Biomedical Engineering Society of Thailand, Council of Engineers in Thailand, and Engineering Institute of Thailand. He has served as Vice President of the Thailand Health Technology Association and the Thai Engineering in Medicine and Biology Society. Dr. Theera-Umpon is a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and is a life member of the Asia-Pacific Signal and Information Processing Association (APSIPA) in which he is the Founding Chair of APSIPA Thailand Chapter. He has published more than 250 full research papers in international refereed publications and an additional handful of them in national publications. His textbooks in Thai language include Digital Signal and Image Processing: Theories and Applications, Advanced Digital Signal Processing, Digital Signal Processing in Telecommunications, etc. Whereas the textbook “Digital Signal and Image Processing: Theories and Applications” received The Outstanding Engineering Textbook Award 2022 from The Fund Management Committee for Education and Research in Engineering Under The Royal Patronage of His Royal Highness Crown Prince Maha Vajiralongkorn, Engineering Institute of Thailand Under H.M. The King’s Patronage. He was recognized as “World’s Top 2% Scientists” (Career-long citation impact in Artificial Intelligence & Image Processing) by Stanford University in 2025. His research interests include Pattern Recognition, Digital Image Processing, Artificial Intelligence, Neural Networks, Fuzzy Sets and Systems, Machine Learning, Big Data Analysis, Data Mining, Medical Signal and Image Processing.



Keynote Session 6

11:40~12:10

Wed. August 19, 2026

Room : Main Conference Hall



Prof. Young Park
(Hanbat National University, Korea)

Transition Strategies for Condition-Based Maintenance in Korean Electric Railway

Abstract

This presentation details the transition from Time-Based Maintenance (TBM) to Condition-Based Maintenance (CBM) for Korean electric railway power facilities. It addresses the critical absence of sensor calibration standards and proposes a phased standardization of preventive diagnosis protocols among manufacturers. The master plan emphasizes the necessity of specialized workforce for accurate data analysis to distinguish system noise from actual faults, outlining a systematic roadmap toward a Predictive Maintenance (PdM) framework.

Biography

Dr. Young Park is an Associate Professor in the Department of Electrical System Engineering at Hanbat National University. Holding a Ph.D. in Engineering, he has over 20 years of research experience in the railway sector. He served as a senior researcher at the Korea Railroad Research Institute (KRRRI) from 2004 to 2019. Most recently, he spearheaded the Pre-diagnosis System Master Plan for the Korea National Railway (2025-2026).



10:00~10:30

Thu. August 20, 2026

Room : Main Conference Hall



Dr. Zhanna Suimenbayeva
(Mukhametzhan Tynyshpayev ALT University, Kazakhstan)

Kazakhstan Railways 2050: Digital Transformation and Development of International Transport Corridors

Abstract

The railway sector plays a strategic role in Kazakhstan's economic development and its integration into global logistics networks. As a key transit country connecting Asia and Europe, Kazakhstan has significant potential to strengthen its position within international transport corridors through the modernization and digital transformation of its railway infrastructure. This paper examines the vision of "Kazakhstan Railways 2050," focusing on the adoption of advanced digital technologies, intelligent transport systems, artificial intelligence, big data analytics, digital twins, and predictive maintenance solutions to improve operational efficiency, safety, and service quality.

Particular attention is given to the development of major international transport routes, including the Trans-Caspian International Transport Route (Middle Corridor), the Belt and Road Initiative corridors, and regional Eurasian logistics networks. The study analyzes the challenges and opportunities associated with increasing freight capacity, reducing transit times, improving interoperability, and enhancing cross-border cooperation.

The paper proposes a strategic framework for the digital transformation of Kazakhstan's railway sector through the integration of smart infrastructure, automated traffic management systems, real-time monitoring platforms, and sustainable transport solutions. The expected outcomes include increased competitiveness of Kazakhstan's

transport system, improved resilience of supply chains, greater efficiency in freight transportation, and stronger participation in global trade flows.

The findings contribute to the understanding of how digital innovation can support the long-term development of railway transport and international logistics corridors, positioning Kazakhstan as a leading Eurasian transportation hub by 2050.

Biography

Zhanna Suimenbayeva has 20 years of scientific experience. Specialist in the field of space, information and satellite technologies. Also she was a project manager in international projects funded by 6 Erasmus+, USAID, UNDP and International Union of Railways. She is the author of 2 textbooks, 1 patent and more than 45 scientific publications in local publications, publications of near and far abroad (including those with a non-zero impact factor).



10:30~11:00

Thu. August 20, 2026

Room : Main Conference Hall

Prof. Nguyễn Nhờ
(Ho Chi Minh City University of Technology, Vietnam)



A Progressive SVPWM Research for Four-Level Inverters — Reducing Common-Mode Voltage, Harmonic Distortion, and Switching Loss

Abstract

Four-level inverter topologies — the Neutral Point Clamped (4L-NPC) and the Nested NPC (4L-NNPC) — are strong candidates for medium-voltage, high-power drives and renewable energy applications. Both share a challenge absent in odd-level inverters: the complete absence of zero common-mode voltage (CMV) states in the space vector diagram (SVD), making CMV elimination structurally impossible and demanding dedicated PWM strategies. This keynote presents a progressive research that systematically address the CMV-harmonic-switching-loss trilemma across both topologies, unified by a common algorithmic backbone: the four-level to two-level SVD (4L→2L SVD) transformation.

For the 4L-NPC inverter under externally balanced DC sources, four methods are developed. AZCMV PWM introduces virtual average-zero CMV vectors — midpoints of adjacent RCMV vector pairs — reducing peak-to-peak CMV to $V_d/9$, up to five times lower than SPWM, while suppressing the low-frequency third-harmonic CMV component. SVPWM0/SVPWM1 and the hybrid HSVPWM exploit seven redundant RCMV vector pairs unique to even-level inverters, enabling Three-Level CMV (3L-CMV) discontinuous PWM modes via nearest-three-vector synthesis. This provides near-SPWM harmonic quality, reduces switching loss by up to 40%, and achieves 40–60% CMV reduction versus SPWM. OP1-SVPWM further minimizes switching loss by adaptively clamping the

highest-current phase at each sampling instant, achieving more than 20% additional loss reduction versus SVPWM0/1 and up to 50% versus SPWM and AZCMV PWM, validated experimentally on a TMS320F28379-controlled prototype.

For the 4L-NNPC inverter, AZCMV2 PWM extends the virtual-vector framework to a topology with flying capacitors. The redundant switching states simultaneously satisfy the average-zero CMV condition and regulate flying-capacitor voltages. The method reduces peak CMV by 40% versus SPWM and line-voltage THD by up to 14% versus AZCMV PWM, while maintaining stable capacitor voltage ripple of approximately 0.05–0.06 p.u., confirmed by PLECS simulation at $V_d = 2400$ V.

Biography

Nho-Van Nguyen (M'05) was born in Vietnam in 1964. He received the M.S and Ph.D. degrees in electrical engineering from the University of West Bohemia, Plzen, Czech Republic, in 1988 and 1991, respectively.

Since 1992, he has been with the Department of Electrical and Electronics Engineering, Ho Chi Minh University of Technology, Vietnam National University Ho Chi Minh City, Vietnam, where he is currently an Associate Professor. He was with KAIST as a Postdoctoral Fellow for six months in 2001 and a Visiting Professor for one year in 2003–2004. His research includes modeling and control of switching power supply, active power filters, and PWM techniques for power converters.



11:20~11:50

Thu. August 20, 2026

Room : Main Conference Hall



Prof. Assel Mukasheva
(Kazakh-British Technical University, Kazakhstan)

Visual Monitoring and Image Analysis for Sustainable Agriculture: A Review

Abstract

This review focuses on image-based monitoring and visual analysis in the field of sustainable agriculture. It examines how image processing and artificial intelligence techniques are used to extract useful information from visual data relating to agriculture. The review discusses their application in monitoring crops and pasture environments, with a emphasis on automated measurements and visual assessment. The main objective is to summarize current approaches, identify key limitations and determine promising areas of development for the creation of practical monitoring systems in agriculture

Biography

Professor Mukasheva currently holds the position of Professor at the School of IT and Engineering at Kazakh-British Technical University (KBTU), where she has been contributing for the past three years. Her professional expertise is computer science and data analytics and cyber security. She has authored over 100 peer-reviewed papers in various international journals. She became the winner of the contest “Best University Teacher - 2022” and received a grant from the Ministry of Science and Higher Education of the Republic of Kazakhstan. Also, in 2023 she received a grant from the U.S. Embassy in Kazakhstan to conduct research in the field of cyber security. By the Decision of the

committee for quality assurance in the field of Science and higher Education under the Ministry of Science and Higher Education of the Republic of Kazakhstan, Professor Mukasheva was awarded the Title of Associate Professor in the specialty “Computer Science and Information Technology” in 2024. She has published several monographs and textbooks. Her research and teaching focus on advancing education, research, and innovation in her field.



11:50~12:20

Thu. August 20, 2026

Room : Main Conference Hall

Prof. Aydogan Ozdemir
(Kadir Has University, Turkey)



Next-Generation Resilient Rail Electrification: Integrating Storage, Renewables, and Intelligence

Abstract

Railway electrification is evolving to address reliability, sustainability, and digitalization. Traditional traction power systems, built for predictable loads and centralized supply, now face challenges from renewable intermittency, extreme weather, and cyber-physical risks. This talk presents a framework for resilient rail electrification integrating distributed energy resources, storage, and intelligent control.

Trackside and substation storage capture regenerative braking energy, stabilize voltage, and provide fast disturbance support. Renewable integration, such as corridor-based solar PV, enables decarbonization but introduces variability requiring coordinated control. Data-driven and physics-informed intelligence supports real-time monitoring, state estimation, and adaptive control, enabling predictive resilience.

Resilience metrics and operational strategies are discussed to assess robustness against faults, cyber threats, and supply disruptions. The speech highlights digital twins, machine learning, and distributed control as enablers of self-healing traction networks.

Biography

Dr. Aydogan Ozdemir earned his B.Sc., M.Sc., and Ph.D. degrees in electrical engineering from Istanbul Technical University (ITU) in Istanbul, Turkey, in 1980, 1982, and 1990, respectively. With over 40 years of experience at ITU, he currently serves as a full professor and the R&D Director at Kadir Has University in Istanbul. His research interests focus on electric power systems and high-voltage engineering, particularly in asset management, reliability analysis, and the application of intelligent methods in power system modeling, simulation, analysis, control, smart grids, and building automation systems. He has published more than 200 technical papers and has been involved in several research projects. Additionally, he is a member of the National Chamber of Turkish Electrical Engineering and a Senior Member of IEEE PES.



15:00~17:00

Wed. August 19, 2026

Room 1

Chair: Wooyong Kim (*Incheon National University*)

OS1-1 DC series arc characteristics with inductive load

15:00~15:20 Hyosung KIM[†]
Namseoul University, Korea

OS1-2 Optimal Extraction of Minor Loops for Improved Hysteresis Modeling of LFP Batteries

15:20~15:40 Kunwoo Na, Youngseoung Kim, and Wooyong Kim[†]
Incheon National University, Korea

OS1-3 Temperature Distribution Prediction and Residual-Based Abnormal Heat Generation Diagnosis for a 6S2P Pouch-Type Battery Module

15:40~16:00 Youngseoung Kim, Kunwoo Na, and Wooyong Kim[†]
Incheon National University, Korea

OS1-4 A Study of Electrical Signal Representations with Machine Learning for Stator Inter-Turn Short-Circuit Fault Diagnosis in Synchronous Generators

16:00~16:20 Thanakrit Maneerat¹, Zulfa Hana Maulida¹, Nitthinan Borirak¹, Bernadetha Grace Wisdayanti¹, Chatchawan Chaichana¹, Montri Luengchavanon², and Woradej Manosroi^{1,*}
¹*Chiang Mai University, Thailand*, ²*Prince of Songkla University, Thailand*

OS1-5 Performance Evaluation of Machine Learning Classifiers for Stator Inter-Turn Short-Circuit Fault Diagnosis in Hydroelectric Synchronous Generators Under Synthetic Industrial Noise Environments

16:20~16:40 Zulfa Hana Maulida¹, Thanakrit Maneerat¹, Nitthinan Borirak¹, Bernadetha Grace Wisdayanti¹, Chatchawan Chaichana¹, Montri Luengchavanon², and Woradej Manosroi^{1,*}
¹*Chiang Mai University, Thailand*, ²*Prince of Songkla University, Thailand*

OS1-6 Design of an IoT-Based Dam Water Level Monitoring System Using Pulsed Coherent Radar

16:40~17:00 Bouakham PHOUTTHAVONG*, Witsarut ACHARIYAVIRIYA, and Watcharin SRIRATTANAWICHAIKUL
Chiang Mai University, Thailand



Oral Session 2

Artificial Intelligence

15:00~17:20

Wed. August 19, 2026

Room 2

Chair: Jeonghwan Gwak (*Korea National University of Transportation*)

- OS2-1** **Parameter-efficient Few-shot Adaptation for Pothole Detection Under Domain Shift**
 15:00~15:20 Changjoon Park, Hyunseok Song, Junhwi Park, Jaehyun Lee, Namjung Kim, Jeong Won Kang, and Jeonghwan Gwak[†]
Korea National University of Transportation, Korea
- OS2-2** **Continual Industrial Anomaly Detection under Temporal Distribution Shifts via Distribution Alignment**
 15:20~15:40 Junhwi Park, Changjoon Park, Namjung Kim, Jaehyun Lee, Hyunseok Song, Jeong Won Kang, and Jeonghwan Gwak[†]
Korea National University of Transportation, Korea
- OS2-3** **A Study on Improving the Interpretability of Industrial Multivariate Time Series Anomaly Detection Using a Gated Transformer-AE Based on SWaT Dataset**
 15:40~16:00 Namjung Kim, Junhwi Park, Changjoon Park, Jaehyun Lee, Hyunseok Song, Jeong Won Kang, and Jeonghwan Gwak[†]
Korea National University of Transportation, Korea
- OS2-4** **Comparative Study of Vision-Language Model Distillation Methods for Road Damage Detection**
 16:00~16:20 Jaehyun Lee, Hyunseok Song, Changjoon Park, Namjung Kim, Junhwi Park, Jeong Won Kang, and Jeonghwan Gwak[†]
Korea National University of Transportation, Korea
- OS2-5** **Enhancing YOLO-World for Road Damage Detection through Fine-tuning of CLIP's Text Encoder**
 16:20~16:40 Hyunseok Song, Jaehyun Lee, Changjoon Park, Junhwi Park, Namjung Kim, Jeong Won Kang, and Jeonghwan Gwak[†]
Korea National University of Transportation, Korea
- OS2-6** **Sensor-Efficient Condition Diagnosis for Predictive Maintenance of Hydraulic Press Subsystems**
 16:40~17:00 Jeonghwan Gwak, Jae-Hak Jeong, Joon Hwang[†], and Seung Woo Ra[†]
Korea National University of Transportation, Korea
- OS2-7** **Robustness Analysis of Lightweight Time Series Anomaly Detection Models and Dynamic Thresholding under Distribution Shifts**
 17:00~17:20 Jeonghwan Gwak[†]
Korea National University of Transportation, Korea



Oral Session 3

BIM & Related Technologies

15:00~16:20

Wed. August 19, 2026

Room 3

Chair: Seungkwon Shin (*Korea Railroad Research Institute, Korea*)

- OS3-1** **Gasification-Internal Combustion Engine-Organic Rankine Cycle System for Broiler Farm Waste-to-Energy: A Techno-Economic-Environmental Assessment with Sensitivity Analysis**
15:00~15:20
Nitthinan Borirak and Chatchawan Chaichana*
Faculty of Engineering, Chiang Mai University, Thailand
- OS3-2** **A Mobile LiDAR-Based BIM-AR-Integrated Workflow for Rebar Inspection Supporting BIPV Integration**
15:20~15:40
Hojeong Jeong, and Sungjin Kim†
Hanbat National University, Korea
- OS3-3** **Building-Type-Specific Glazing Optimization for Korean Climate Zones Using Commercial Glass Data and Genetic Algorithms**
15:40~16:00
Junyoung Lee, Dongsu Kim†, Ruda Lee, Jongho Yoon, and Hansol Lim
Hanbat National University, Korea
- OS3-4** **An Improved Machine Learning Framework for DGA-Based Fault Classification of Oil-Immersed Transformers**
16:00~16:20
Nikone Simphilavong and Sirote Khunkitti*
Chiang Mai University, Thailand



Poster Session 1

13:30~14:50

Wed. August 19, 2026

Room : Conference Hall Corridor

Chair: Wonsik Moon (*Soongsil University, Korea*)

Don Ha Hwang (*Korea Electrotechnology Research Institute, Korea*)

Nipon Theera-Umporn (*Chiang Mai University, Thailand*)

- PS1-01** **Variable DC-Link voltage control for output power satisfaction in sensorless Flux weakening ISG drives**
 JAEHWAN LIM, HAGWONE KIM[†], and KWANYUHL CHO
Korea National University of Transportation, Korea
- PS1-02** **Power Characteristic Analysis and Delay Compensation Control for Parallel Inverter Modules with Encoder Signal Delay**
 JiHo Choi^{1,2}, JiYe Byun^{2,3}, JeongWook Lee², TaeKyu Kim³, ByoungGun Park^{1,2}, DonHa Hwang², and JiWon Kim^{1,2*}
¹University of Science Technology, Korea, ²Korea Electrotechnology Research Institute, Korea, ³Changwon National University, Korea
- PS1-03** **Comparative Analysis of Crystal Orientation in Arc Beads under Different Cooling Conditions**
 Kwangmuk Park*, Junghwan Kim, Chiwoo Choi, and Daeryeong Beak
Electric Safety Research Institute, Korea Electric Safety Corporation, Korea
- PS1-04** **Development of a Safety Assessment Framework for Fixed-Type Offshore Wind Power Facilities Using AHP-FMEA Methodology**
 Hae Gweon Kang*, Sung Koo Cho, Su Jeong Oh, Ju Hee Jang, Jong Min Kim, and Yeon Sub Sim
Korea Electrical Safety Corporation, Korea
- PS1-05** **Development of a Machine Learning-Based Abnormal State Diagnosis Model for Smart Circuit Breakers**
 Hung Anh Pham, Ga-Eun Jung, Jun-Yeop Lee, and Seok-Ju Lee[†]
Changwon National University, Korea
- PS1-06** **An Optical-Based Arc-Fault Detection Standard for Low-Voltage Distribution Panels: Closing the Coverage Gap of Current-Based Regulation in the KEC**
 Na-Ra Lee, Dong-Il Cho, Yun-Jin Cho, Hwi-Geon Cha, and Won-Sik Moon*
Soongsil University, Korea

- PS1-07 Comparative Study on Insulation Fault Detection Characteristics of Insulation Monitoring Devices According to Installation Configuration in Multi-Output DC Electric Vehicle Charging Systems**
Ga-Ram Han, Jae-Kyung Park, and Ki-Yeon Lee[†]
Korea Electrical Safety Corporation, Korea
- PS1-08 XGBoost-based Risk Prediction Study Using Time Series Data of Low-Voltage Electrical Facilities**
Young-Chae Mun, Ki-Yeon Lee[†], Ga-Ram Han, Seung-Taek Lim, Chan-Hyeok Oh, and Jae-Kyung Park
Korea Electrical Safety Corporation, Korea
- PS1-09 Effects of Cable Arrangements on Heat Release Rate Predictions for Electrical Cable Tray Fires**
Hyun-Min Kang¹, Jaiho Lee², Seong-Hun Yoon³, and Ho-Young Lee^{1*}
¹Changshin University, Korea, ²Korea Institute of Nuclear Safety, Korea, ³Korea Electrotechnology Research Institute, Korea
- PS1-10 Experimental and Multiphysics Investigation of Polarity Effects on Surface Discharge in a Needle-Plate Electrode System**
Bat Orshikh Khurbold¹, Seong-Hun Yoon¹, Don-Ha Hwang², and Ho-Young Lee^{1*}
¹Changshin University, Korea, ²Korea Electrotechnology Research Institute, Korea
- PS1-11 A Study on CMV Variation Characteristics According to SoC in Grid-Connected ESS**
YongEun Choi¹, SangNyeong Park¹, MinSeok Jeon¹, KyungWan Koo², and JaeMoon Kim^{1†}
¹Korea National University of Transportation, Korea, ²Hoseo University, Korea
- PS1-12 Business Feasibility Assessment of the Unsan-ri Solar Photovoltaic Project in Salt-Damaged Reclaimed Land, Daesan-eup, Seosan-si**
MIN-KOO JI¹, WOO-SEOK LEE¹, MI-YOUNG KIM², JUNG-NAM LEE², and KYUNG-WAN KOO^{1*}
¹Hoseo University, Korea, ²Chungnam Energy Research Institute, Korea
- PS1-13 Business Feasibility Assessment of Wind Power Candidate Sites in Dangjin and Asan Considering Environmental Criteria for Offshore Wind Preliminary Zones**
MIN-KOO JI¹, WOO-SEOK LEE¹, JUNG-NAM LEE², MI-YOUNG KIM², WON-JUN YUN³, EUN-A KIM³, and KYUNG-WAN KOO^{1*}
¹Hoseo University, Korea, ²Chungnam Energy Research Institute, Korea, ³Asan City Council, Korea
- PS1-14 Decoupled gain matching inverse design of bidirectional CLLLC resonant converter**
hyeongjin lee, hagwone kim[†], and Eunseop kim
Korea National University of Transportation, Korea

- PS1-15 High-Efficiency Isolated Single-Phase Inverter Using a Phase-Shifted Full-Bridge Converter and Unfolding circuit With PI-Repetitive Control**
EunSeop Kim and HagWone Kim[†]
Korea National University of Transportation, Korea
- PS1-16 Operation Analysis and Transfer Function Derivation of Three-Phase Unfolding Inverter for Renewable Energy**
SuHo Park and HagWone Kim[†]
Korea National University of Transportation, Korea
- PS1-17 Distribution network investment planning considering peer-to-peer energy trading under a locational loss-based network charge**
Huijung Kim, Jaebeom Oh, and Hyunjoong Kim[†]
Hanbat National University, Korea
- PS1-18 Analysis of Power Sharing Characteristics in a Series Hybrid Electric Propulsion System for a Tracked Combat Vehicle during Grade Climbing**
SangHwa KIM¹, Taekue KIM¹, Suji Han¹, ChangDae JOO¹, Ji Won KIM², Byeong Gun PARK², Sug Hun CHANG², and Don Ha HWANG²
¹Changwon National University, Korea, ²Korea Electrotechnology Research Institute, Korea
- PS1-19 Automated Design and Transient Validation of AIS Direct Stroke Lightning Protection Using Python and EMTP-ATPDraw Based on IEEE Std 998-2012**
P. Jaiboon and T. Thanasaksiri[†]
Chiang Mai University, Thailand
- PS1-20 Physics-Informed Neural Network-Based Real-Time Thermal Behavior Prediction for Electrical Connection Joints**
Ga-Eun Jung and Seok-Ju Lee[†]
Changwon National University, Korea
- PS1-21 Deep Learning Approaches for Image-Based Animal Phenotype Recognition**
Assel Mukasheva¹, Dina Koishiyeva¹, Hyo Sook Park², and Eun Mi Choi², and Jeong-Won Kang^{2†}
¹Kazakh British Technology University, Kazakhstan, ²Korea National University of Transportation, Korea
- PS1-22 Improving SSH Detection Model Using VAE-WGAN-GP with Latent Consistency Loss and Entropy-Based Fidelity Evaluation**
Junwon Lee[†]
Duksung Women's University, Korea
- PS1-23 Graph Embedding-Based Synthetic Data Selection for SSH Intrusion Detection**
Junwon Lee[†]
Duksung Women's University, Korea

- PS1-24 Design and Implementation of a Wi-Fi-Based Wireless Firmware Update System for Modular Multilevel Converter Sub-Modules**
JiYe Byun^{1,2}, Donha Hwang¹, Jungwook Lee¹, Jiho Choi¹, Byeonggeon Park¹, Taekyu Kim², Sungmin Yoon³, and Jiwon Kim^{1*}
¹Korea Electrotechnology Research Institute, Korea, ²Changwon National University, Korea, ³MINLAB, Korea
- PS1-25 A Study on AI-Based Control Delay Estimation Method for Evaluating the Operating Status of Traffic Signal Controllers**
Jaeho Cho and Jintae Kim[†]
Korea National University Of Transportation, Korea
- PS1-26 A Study on the Estimation of Optimal Safety Measures Using PSO technique for Preventing Railway Accidents**
Song Eun Ju and Kim Sang ahm[†]
Korea Railroad Research Institute, Korea
- PS1-27 A Study on the Development of MMC-Based Next-Generation Active Railway Power Supply System**
Hyungchul Kim[†], Seungkwon Shin, and Hosung Jung
Korea Railroad Research Institute, Korea
- PS1-28 Preliminary review of maximum span length of overhead catenary lines due to changes in curve radius and rearward displacement**
HYOENGJIN LEE¹, HYUNIL KANG^{1†}, KIWON LEE², WONSEOK CHOI¹, DONGGU LEE¹, and YOUNG PARK¹
¹Hanbat National University, Korea, ²Korea Railroad Research Institute, Korea
- PS1-29 Development of Vision-Based Dynamic Characteristic Evaluation Technology for Overhead Contact Lines**
Chulmin PARK^{1†}, Yongseok KIM¹, Kiwon Lee¹, Younghyun CHO¹, and Young PARK²
¹Korea Railroad Research Institute, Korea, ²Hanbat National University, Korea
- PS1-30 Development Trends in AI-based HVAC Control Technology for Railway Stations**
Shin Seung Kwon, Ahn Seung Ho Ahn, Kim Hyung Chul, and Choi Sang Ryul
Korea Railroad Research Institute, Korea



Poster Session 2

15:00~16:30

Thu. August 20, 2026

Room : Conference Hall Corridor

Chair: Jong Nam Kim (*YSFS Co.,Ltd., Korea*)

Wonseok Choi (*Hanbat national university, Korea*)

Hyunil Kang (*Hanbat national university, Korea*)

PS2-31 Development on Real-Time Train Congestion Display System

Seung Yong Won, Hyunjo Ahn, and Jeong-Won Kang[†]

Korea National University of Transportation, Korea

PS2-32 A study on Train Position Display in RF-CBTC train control system

Jongnam Kim, Wook Jin Hwang, Dong Hoon Park, and Jeong-Won Kang[†]

Korea National University of Transportation, Korea

PS2-33 Deployment and Applicability of Eco-friendly Technologies in Electric Railway

Park Jong Hak, Haesan Park, and Jeong-Won Kang[†]

Korea National University of Transportation, Korea

PS2-34 A Study on Energy saving for Urban Railway Operation using Train Performance Simulator

Lee Min Gyu, Ho Hyun Han, and Jeong-Won Kang[†]

Korea National University of Transportation, Korea

PS2-35 Power System Protection Systems due to the Regenerative Braking of Urban Rail Vehicles

Park Jong Hak, Junoh Kim, Chan hee Weon, Sung Cheol Han, and Jeong-Won Kang[†]

Korea National University of Transportation, Korea

PS2-36 AI technology to mitigate train-animal collisions

Jihoon Kwak¹, Assel Mukasheva², Dina Koishiyeva², Aidos Anel², Oh-Kuen Kwon³, and Jeong-Won Kang[†]

¹*Korea National University of Transportation, Korea*, ²*Kazakh-British Technology Univesity, Kazakhstan*, ³*Semyung University, Korea*

PS2-37 A Study on Algorithms for Real-Time Condition Monitoring of Railway Vehicle Batteries

MINSEOK JEON, YONGEUN CHOI, SANGNYEONG PARK, and JAEMOON KIM[†]

Korea National University Of Transportation, Korea

- PS2-38 Development of Remaining Passenger Notification System using artificial intelligence**
Jongnam Kim, Sangyep Shin, and Jeong-Won Kang[†]
Korea National University of Transportation, Korea
- PS2-39 Development of AI-based Railway Crossroads Risk Factor Prediction System**
Hyunjung Kang, Hyunjo Ahn, and Jeong-Won Kang[†]
Korea National University of Transportation, Korea
- PS2-40 An LLM and AI Tool-Based Methodology for Designing Dedicated Railway System Maintenance Chips**
Juhee Choi[†]
Sangmyung University, Korea
- PS2-41 A Simulation Framework for Evaluating the Performance of an Adaptive Kinetic Facade System for Existing Buildings: A Preliminary Study**
Gyeong Yun, Jong Ho Yoon, and Dong Su Kim[†]
Hanbat National University, Korea
- PS2-42 Façade BIPV Potential and Power Generation for Apartment ZEB Certification**
RUDA LEE, JUNYOUNG LEE, DONGSU KIM, and JONGHO YOON[†]
Hanbat National University, Korea
- PS2-43 Design of High-Efficiency PMa-SynRM for BIPV-Integrated Water Pumping Systems**
Jinhan Kim and Kichan Kim[†]
Hanbat National University, Korea
- PS2-44 Optimal Design and Operational Characteristic Analysis of High-Efficiency PMSM for BIPV Tracking Systems**
Jinha Park, Jinhan Kim, Juhyeong Kim, and Kichan Kim[†]
Hanbat National University, Korea
- PS2-45 Comparison of Operating Characteristics of a Two-Transformer Phase-Shifted Full-Bridge Converter According to the Presence of a Primary-Side Capacitor**
Kang-Min Shin and Mina Kim[†]
Hanbat National University, Korea
- PS2-46 High-Efficiency Tracking and Output Voltage Control of a Synchronous Buck Converter for BIPV DC/DC Power Conversion**
Taekyu Park and Mina Kim[†]
Hanbat National University, Korea
- PS2-47 Three-Phase Five-Level ANPC Inverter with Minimized Switching Transitions for High-Voltage PV Grid-Connected Applications**
Beom-Ki Cho¹, Do-Hyeon Kim¹, Woo-Young Choi², and Jung-Min Kwon^{††}
¹*Hanbat national university, Korea*, ²*Jeonbuk National University, Korea*

- PS2-48 Modular electrical power system for an electric propulsion ship**
 Beom-Ki Cho¹, Do-Hyeon Kim¹, Woo-Young Choi², and Jung-Min Kwon^{1†}
¹Hanbat national University, Korea, ²Jeonbuk National University, Korea
- PS2-49 Multivariate Conditional GAN-Based Condition Grading of Insulation Degradation in BIPV-ESS for BIM-Integrated Maintenance Support**
 Dajeong Seok, Young Park, YUNA SONG, and Hyun-il Kang[†]
 Hanbat National University, Korea
- PS2-50 Environment-Compensated GAN-Based Insulation Anomaly Detection for BIPV-Coupled ESS under Variable Solar Conditions**
 Jiwon Lim, Young Park, Won Seok Choi, Hyun-il Kang[†], and Yu-na Song
 Hanbat National University, Korea
- PS2-51 Control Algorithm for Output Current THD Reduction of Flyback Converter-Based Microinverter**
 Pyeong-Kang Kim, Ui-Chang Mun, and Seung-Ho Song[†]
 Korea National University of Transportation, Korea
- PS2-52 Energy Performance Evaluation of Subway Stations**
 SEUNG KWON SHIN[†] and HYUNG CHUL KIM
 Korea Railroad Research Institute, Korea
- PS2-53 Development of a Dynamic Digital Twin and Data Integration Framework for a Diesel Engine in 3DEXPERIENCE**
 Ju-Min Park, Ga-Eun Jung, Seung-Won Park, and Seok-Ju Lee[†]
 Changwon National University, Korea
- PS2-54 Integrated Design of an Ozone-Based Water Reclamation and Nutrient Recirculation System for Smart Hydroponic Cultivation**
 JEE-HWAN AHN¹, WOO-SEOK LEE⁵, BYUNG-OK CHO², KI-SOO TACK³, JONG-TAEK PARK⁴, and KYUNG-WAN KOO⁵
¹SEDNA Co., Ltd., Korea, ²SEGEON HI-TECH Co., Ltd., Korea, ³Daeduk Science & Technology Social Cooperative, Korea, ⁴C-MAC, Korea, ⁵Hoseo University, Korea
- PS2-55 A Lightweight Vision-Based Framework for Object Orientation and Grasp Point Estimation Using ROI Contour Analysis and Ellipse Fitting**
 Jaehong Kim and Wooyong Kim[†]
 Incheon National University, Korea
- PS2-56 Preparation Development of an Attitude Stabilization System for Septic Tank Sampling Using Wire-Driven Mechanisms and Passive Gimbal Structures**
 Yoon Ji Roh¹, Byeong Woo Kim¹, Soo Min Kang², and Woo Yong Kim^{1*}
¹Incheon National University, Korea, ²Garam Co., Ltd., Republic of Korea

PS2-57 How Much Finer Resolution Helps Differs Across Geometries

Yong Ki Kim¹, Kang-Moon Park^{2†}, and Jeong Won Kang²

¹University of Colorado – Boulder, USA, ²Korea National University of Transportation, Korea

PS2-58 High-throughput impedance-based analysis tool with fibrous nanopatterns for clinically compatible drug screening

Doyoung Kim and Hyung Jin Kim[†]

University of Ulsan, Korea

PS2-59 Performance and Reliability of Electrode Sheet-Based Cell/Module Integrated PV Modules

Donggun Lim[†], Mingyu Kwak, Sungjun Cho, Sung Deok Seo, and Sunwoo Yun

Korea National University of Transportation, Korea

PS2-60 High-voltage sensorless control algorithm for high voltage capacitor charger

Ui-Chang Mun, Pyeong-Kang Kim, and Seung-Ho Song[†]

Korea National University of Transportation, Korea

The Korean Institute of Electrical Engineers (KIEE) Electrical Facilities Society

ICEF 2026 International Conference Sponsors & Supporters

We sincerely thank all of our sponsors and supporting organizations for their generous contributions to the success of the ICEF 2026 International Conference.

- | Faculty of Engineering, Chiang Mai University
- | Hanbat National University
- | Korea National University of Transportation
- | JIN Engineering & Architects Co.,Ltd.
- | SINWOO DESIGN & CONSTRUCTION Co., Ltd.
- | YSFS Co., Ltd.
- | Korea Railroad Research Institute

