Keynote Session 1

09:00~09:30 Tue, August 19, 2025

Room : Conference Hall

Dr. Chatchawan Chaichana
(Faculty of Engineering, Chiang Mai University, Thailand)

Decarbonization in Building Sector

Abstract

The building sector plays a crucial role in global decarbonization efforts, accounting for a significant share of energy consumption and carbon emissions. Decarbonization in this sector spans both pre-construction and post-construction phases. While pre-construction focuses on sustainable materials, design, and construction practices, the post-construction phase—the operational lifetime of buildings—presents the greatest opportunity for impactful and immediate carbon reduction through energy efficiency.

Buildings consume a substantial portion of total global energy, with electricity being the dominant form of energy used, especially in urban environments. The primary systems responsible for electricity consumption in buildings include air conditioning (approximately 40–50%), lighting (15–20%), and other electrical appliances and systems (30–40%), though this can vary by region and building type.

Improving energy efficiency in each of these systems can lead to significant reductions in energy use and associated emissions. For air conditioning, strategies such as high-efficiency HVAC equipment, smart thermostats, and building envelope improvements can cut energy use by up to 30–40%. In lighting, transitioning to LED technology and using daylighting strategies can reduce consumption by over 50%. Efficient appliances, load management, and the integration of smart control systems can also optimize overall building energy use.

When applied holistically, energy efficiency measures can reduce total building energy consumption by 20–40%, making it a cornerstone of decarbonization strategies. As buildings are expected to remain operational for decades, prioritizing energy efficiency in the post-construction phase is not only cost-effective but also essential for achieving long-term carbon neutrality goals in the built environment.

Biography

Prof.Chatchawan Chaichana is a distinguished expert in energy efficiency with a wealth of experience in both academic research and practical applications in the industrial sector. His work centers on improving the performance and reducing the energy consumption of key systems such as air conditioning and heat pumps—among the most energy-intensive equipment in buildings. He has provided technical expertise to both private enterprises and government agencies, helping them implement energy-saving strategies and reduce their environmental footprint.

Prof. Chatchawan has also been actively involved in international research collaborations. He has worked with The University of Melbourne and Kyoto University on projects related to smart energy systems and sustainable technologies. Notably, he has led a long-standing collaboration with Hanbat National University in South Korea, where he coordinates an international capstone project between students from Chiang Mai University and Hanbat National University. This program fosters cross-cultural teamwork and real-world problem solving, as students jointly design and develop innovative engineering solutions with a focus on energy and sustainability.

Currently, Prof. Chatchawan's research focuses on electricity load decomposition and solar energy electrification for remote and underserved areas, aligning with global efforts to expand access to clean, reliable power.

Keynote Session 2

09:30~10:00 Tue, August 19, 2025

Room : Conference Hall

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

Sub One Shot Learning: Generalising When Data is Scarcer Than One

Abstract

My current line of research, entitled Sub One Shot Learning (SOSL), tackles the hitherto neglected situation in which the expected number of labelled examples per class (α) is strictly between zero and one. This problem formulation naturally occurs in ultra rare disease imaging, endangered language processing, military anomaly detection, and privacy sensitive on device personalisation—domains where even a single labelled instance can be prohibitively expensive or ethically constrained.

A rigorous PAC Bayesian analysis demonstrates that, as $\alpha \to 0$, empirical evidence vanishes while the KL divergence to a prior becomes the dominant term of the generalisation bound. Consequently, our first contribution is the construction of high fidelity priors distilled from state of the art vision language and medical foundation models. Building upon this theoretical footing, we propose a three layer SOSL pipeline:

1. Variational Bayesian Core — produces a calibrated posterior by jointly minimising task loss and KL divergence;
2. Ultra light Adaptation — adapter modules and prompt tuning inject task specific knowledge with only a few trainable parameters, thereby constraining the divergence term and enabling low power deployment;
3. Single Step Meta Learning — a degenerate MAML loop that adapts in one gradient step, or in the literal zero shot case, defers entirely to the prior.

To prevent synthetic bias when data are nearly absent, we restrict augmentation to group theoretic transformations that respect known symmetries without inducing distributional drift. Empirical studies confirm the merit of this design: on α constrained versions of mini ImageNet and Omniglot the method secures up to 18 % relative accuracy gains, while on a 14 slice MRI set for an ultra rare neoplasm it achieves a clinically actionable AUC 0.87 with tightly calibrated uncertainty.

Ongoing extensions include (i) Continual SOSL, which allows the model to transition smoothly from vacuum level data to moderate abundance without catastrophic forgetting, and (ii) Trustworthy SOSL, which emphasises Bayesian calibration for safety critical decisions. To foster community engagement, our group is releasing an open benchmark and leaderboard devoted to SOSL research.

I warmly invite collaborators who share the ambition of enabling reliable artificial intelligence precisely where data are scarcest.

Biography

Jeonghwan Gwak (Senior Member, IEEE) received the Ph.D. degree in machine learning and artificial intelligence from the Gwangju Institute of Science and Technology (GIST), Gwangju, South Korea, in 2014. From 2002 to 2007, he worked for several companies and research institutes as a researcher and the chief technician. From 2014 to 2016, he worked as a Postdoctoral Researcher with GIST, and from 2016 to 2017 as a Research Professor. From 2017 to 2019, he was a Research Professor with the Biomedical Research Institute and the Department of Radiology, Seoul National University Hospital, Seoul, South Korea. Since 2019, he has been with the Korea National University of Transportation as an Assistant Professor, where he has been an Associate Professor since 2021. He is the Director of the Algorithmic Machine Intelligence Laboratory. His current research interests include deep learning, computer vision, image and video processing, AIoT, fuzzy sets and systems, evolutionary algorithms, optimization, and relevant applications of medical and visual surveillance systems.

Keynote Session 3

10:00~10:30 Tue, August 19, 2025

Room : Conference Hall

Dr. & Prof. Joondong KIM
(Incheon National University, Korea)

Transparent Photovoltaics for Sustainable Ground and Water Energy Platform and Photonic Neuromorphic Devices for Intelligent Systems

Abstract

The global transition toward renewable energy and intelligent computing is driving the development of multifunctional, environmentally integrated technologies. This study presents innovations in transparent photovoltaics and neuromorphic devices designed for both terrestrial and underwater applications. A highly efficient transparent photovoltaic (TPV) module was developed, comprising an FTO/n-ZnO/p-NiO/silver nanowires (AgNWs)/ZnO structure with a transparent p–n junction. By employing metal sputtering techniques to assemble module arrays, we significantly increased the voltage output per unit area, offering new opportunities for building-integrated transparent photovoltaics (BITPVs) that generate solar energy without obstructing visibility.

In parallel, we introduce a water-enhanced transparent photovoltaic system for underwater power generation, addressing critical needs in sensing, networking, and communication for ocean exploration. This wide-bandgap heterojunction device achieves an average visible transmittance of 41% and an underwater power conversion efficiency of 10.25% under monochromatic 470 nm light. The water medium not only focuses incident light but also improves light collection angles, while impedance spectroscopy reveals that a water-induced electric double layer enhances electron transport and photogeneration. Demonstrating its practicality, the system successfully

powered a 10 mW load underwater, establishing a pathway toward secure, energy-autonomous underwater environments.

Additionally, we report on a photonic neuromorphic device based on 2D layer (SnS) into the transparent heterojunction device, capable of performing basic logic operations (OR, NOT, AND) using light as a stimulus. This artificial synapse emulates neurotransmitter-like behavior, modulating signal processing for precise control of logic functions. Such a system promises significant advancements in neuromorphic computing, with potential applications in AI, humanoid robotics, and adaptive intelligent electronics.

Together, these developments represent a significant step toward seamlessly integrated energy-harvesting, intelligent computing, and environmentally adaptive systems for the future.

Biography

Professor Joondong Kim is a professor in the Department of Electrical Engineering and a director in Multidisciplinary Core Institute for Future Energies (MCIFE) at Incheon National University in Korea. He got his PhD 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 + 340 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

10:30~11:00 Tue, August 19, 2025

Room : Conference Hall

Dr. & Prof. Dongsu Kim
(Hanbat National University, Korea)

Performance Evaluation and Modeling of Net-Zero Energy Building Design with VRF System

Abstract

This presentation discusses system design and modeling aspects of VRF systems when integrated into net-zero energy building (NZEB) designs. Various system configurations of VRF systems that can be used in NZEB designs and their influence on the NZEB energy performance will be illustrated. Modeling strategies of VRF systems for NZEB buildings will also be discussed in this presentation. Simulation-based case studies of an office prototype building model with a VRF based NZEB model will be presented to demonstrate potential economic and energetic benefits in various US climate locations.

Biography

Dongsu Kim received the B.S. and M.S. degrees in architectural engineering from Hanbat National University, Daejeon, Republic of Korea, in 2011 and 2013, respectively, and the Ph.D. degree in mechanical engineering from Mississippi State University, MS, USA, in 2019. His doctoral research contributed significantly to the field, particularly in the areas of HVAC systems and renewable energy applications.

Following his Ph.D., Dr. Kim joined the Department of Energy's Building Energy Codes Program as a postdoctoral associate researcher at the Pacific Northwest National

Laboratory (PNNL), USA. During his position at PNNL, he worked on various projects aimed at enhancing building energy efficiency and integrating innovative energy solutions.

Currently, Dr. Kim holds a position as an Assistant Professor at the Department of Architectural Engineering at Hanbat National University. In his academic role, he is dedicated to educating the next generation of engineers and advancing research in building energy system modeling and simulation, HVAC control and optimization, and the application of renewable energy technologies in building systems.

Keynote Session 5

11:20~12:20 Tue, August 19, 2025

Room : Conference Hall

Dr. Khai Phuc Nguyen
(Ho Chi Minh City University of Technology, Vietnam)

Application of Artificial Intelligence Models for Forecasting the Electricity Market

Abstract

This presentation summarizes our group's research on applying artificial intelligence models to forecast electricity loads and solar power generation systems. In Vietnam, electricity demand is growing rapidly, at approximately 10% per year. Our research team has proposed AI methods that utilize time series data for these forecasts. The results indicate that enhanced techniques derived from long short-term memory models yield promising outcomes. Furthermore, Vietnam leads among ASEAN countries in terms of installed solar power capacity. Based on the data collected from weather patterns, our research demonstrates that using artificial intelligence models produces highly accurate forecast results.

Biography

Khai Phuc Nguyen earned his Bachelor of Engineering (B.Eng.) and Master of Engineering (M.Eng.) degrees in electrical engineering from Ho Chi Minh City University of Technology, Vietnam, in 2010 and 2012, respectively. He obtained his PhD from Shibaura Institute of Technology in Japan in 2017. Since then, he has been a full-time lecturer at the Ho Chi Minh City University of Technology, where he specializes in renewable energy and electrical power systems. Additionally, he collaborates with GIZ Vietnam and other enterprises as a technical expert in solar energy in Vietnam. He has over 30 scientific articles on optimization and artificial intelligence in power systems.

Keynote Session 6

11:20~12:20 Tue, August 19, 2025

Room : Conference Hall

Dr. & Prof. Young Park
(Hanbat National University, Korea)

Digitalization Technology for Overhead Contact Line Maintenance

Abstract

This presentation addresses the digitalization of overhead contact line maintenance for railway electrification through a novel management process utilizing 3D scanning and printing. The initiative aims to overcome the limitations of current 2D-based management and manual inspections by creating a 3D database of overhead line components. This approach seeks to enhance maintenance efficiency, improve component development, and support a digital twin framework for the railway industry. The process involves reverse engineering of components, creating precise 3D models with integrated metadata, and utilizing 3D printing for on-demand production and rapid prototyping. This methodology is positioned as a key technology for advancing railway infrastructure management and ensuring a more reliable and safer railway service.

Biography

Dr. & Prof. Young Park is a professor in the Department of Electrical System Engineering at Hanbat National University in Daejeon, South Korea. Prior to his position at Hanbat National University, he was a Principal Researcher at the Korea Railroad Research Institute for 15 years. His research focuses on electric railway systems, including overhead contact lines and the application of digital technologies like 3D scanning and printing for maintenance and manufacturing in the railway industry. He is actively involved in projects aimed at the digital transformation of railway facility management.

Keynote Session 7

09:00~09:30 Wed, August 20, 2025

Room : Conference Hall

Dr. Lee, Junwon
(Samsung SDS, Korea)

Secure and Scalable IoT: An IoT Network Platform Based on Network Overlay and MAC

Abstract

In the VPN (with data encryption) applied to protect the distributed network over the public internet, the small computing resource of low-spec devices limits TCP/IP-based VPN use. Although lightweight IoT communication protocols such as LoWPAN are used, TCP/IP-based VPNs such as IPsec and OpenVPN require bandwidth, CPU/memory, and electric power.

To provide a safe and lightweight network, we propose a secure and scalable IoT platform (SSI) that can prevent security threats while minimizing the usage of computing resources. SSI, which has a lower load than TCP/IP-based VPN, is a layer 2 VPN and supplies data link frame encryption. L2TP and VXLAN are provided for a scalable layer 2 VPN, and the MACsec algorithm encrypts layer 2 frames. Furthermore, SSI shows 30% network speed improvement and 31.6% CPU usage reduction compared to the network applied OpenVPN.

Biography

He is currently serving as a Principal Engineer at Samsung SDS and holds a Ph.D. in Computer Science and Engineering. He began in 2002 as a Network Engineer, dedicating eight years to consulting and developing network infrastructures for notable companies

including Tesco, Hynix, and Samsung. Since 2011, he has advanced his career at the Samsung Security Center as a Security Engineer, where his main duties encompass cloud security auditing, evaluating system architecture for security, and managing security incidents.

His doctoral research delved into AI-based traffic detection and IoT platform security, culminating in contributions to various journals and conferences. More recently, his research interests have shifted towards developing methods for verifying network data through graph embedding techniques. And He is actively working on projects that apply these studies to the security of the company.

Keynote Session 8

09:30~10:00 Wed, August 20, 2025

Room : Conference Hall

Dr. DANG Bang Viet
(Vietnam Electricity (EVN), Vietnam)

Deputy Director of Science Technology & Digital Transformation Department

Abstract

The presentation begins with a comprehensive overview of Vietnam's power system, encompassing the structure and current status of electricity generation, high-voltage transmission networks, and the distribution and retail sector. The next section will discuss key development directions for Vietnam's power system based on the Power Development Plan 8. Following this, the presentation addresses some pressing research issues for Vietnam's power system. In the final part, the presentation highlights Vietnam's latest policies to promote innovation in the energy sector, including new regulations, R&D incentives, and increased collaboration among industry, academia, and policymakers. These efforts aim to foster technological advancement and support the sustainable growth of Vietnam's power sector.

Biography

Dr. Dang Bang Viet graduated from Hanoi University of Science and Technology with an Engineer's degree in Power Systems Engineering in 2002. He completed his Master's program at Grenoble Institute of Technology (France) in 2003. In 2006, he obtained his Ph.D. degree in Power Electronics from Grenoble 1 University (France). From 2007 – 2008, Dr. Viet worked as a research associate at the University of Manchester (UK), where he participated in a high power DC-DC converter design project.

Currently, Dr. Viet is the Deputy Director of the Science, Technology & Digital Transformation Department at Vietnam Electricity (EVN). His work focuses on promoting R&D projects as well as establishing the innovation management system within EVN, aiming to enhance operational efficiency and foster digital transformation in the power sector.

Keynote Session 9

10:00~10:30 Wed, August 20, 2025

Room : Conference Hall

Prof. SangYule Choi
(Induk University, Korea)

The Development of Weather Based Intelligent Demand Controller

Abstract

Direct Load Control(DLC) program is an advanced agreement between a power utility and customers to control some customers' appliances (e.g., air conditioners and water heaters). It is an incentive-based demand response system in which the utility provides the affected customer with financial incentives. Under the existing DLC program, the utility turn on/off customers' appliances without considering the customer's inconvenience. that causes a lot of customers are reluctant to participate in the DLC program. In this paper, To solve this problem, the author present weather based intelligent demand controller to analyze correlation between weather condition and customers energy consumption and to predict customers energy consumption. To demonstrate the validity of the proposed demand controller, porto type demand controller are developed and applied to real customer load.

Biography

He received his B.S, M.S, and Ph.D degrees in electrical engineering from Sung Kyun Kwan University, Suwon, South Korea, in 1996, 1998 and 2002, respectively. Since 2004, he has been a Professor in the Department of Mechatronics Engineering, Induk University, Seoul, Korea. His research interests include demand control, load forecasting and power distribution automation

Keynote Session 10

10:50~11:20 Wed, August 20, 2025

Room : Conference Hall

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

Rail Transport Energy in Kazakhstan: A Strategic Vector in the Era of Green Transformation

Abstract

Modern challenges—such as the growing volume of freight and passenger transportation, the need to reduce greenhouse gas emissions, and the global shift toward sustainable technologies—demand a rethinking of energy strategies in Kazakhstan's railway sector. This keynote will explore key development directions including electrification, the integration of renewable energy sources, improvements in rolling stock energy efficiency, and the potential use of alternative fuels. Special attention will be given to the role of rail transport energy in achieving the national decarbonization strategy and building a sustainable transportation infrastructure.

Biography

Zhanna Suimenbayeva has 20 years of scientific experience. Specialist in the field of space, information and satellite technologiesAlso she was a project manager in international projects funded by6 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).

Keynote Session 11

11:20~11:50 Wed, August 20, 2025

Room : Conference Hall

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

Resilience of UNet-Based Models under Adversarial Conditions in Medical Image Segmentation

Abstract

Adversarial modifications of input data can degrade the stability of deep neural networks in medical image segmentation. This study evaluates the robustness of UNet and Att-UNet++ architectures using the NuInsSeg dataset with annotated nuclear regions from various tissue sources. Both models were trained and tested under eight perturbation types, including gradient-based, iterative, and stochastic methods, with identical parameter settings. In the absence of perturbations, Att-UNet++ produced higher segmentation results with a Dice of 0.7160 and a mean IoU of 0.6190 compared to 0.6424 and 0.4732 for UNet. Under NI-FGSM and Gaussian noise, Att-UNet++ experienced a greater reduction in mean IoU, reaching 0.1215 and 0.0658, while UNet maintained 0.1968 and 0.2329. Loss landscape analysis showed smoother surfaces for Att-UNet++, yet revealed increased responsiveness to directional gradients. The findings suggest that improvements in segmentation accuracy through architectural modifications may be accompanied by increased vulnerability to input perturbations, highlighting the necessity of robustness evaluation in model development for medical image analysis.

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 peered 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 a number of monographs and textbooks. Her research and teaching focus on advancing education, research, and innovation in her field.

Keynote Session 12

11:50~12:20 Wed, August 20, 2025

Room : Conference Hall

Dr. Aydogan Ozdemir, Professor
(Kadir Has Universityş, Turkey)

Resilient traction power supply systems in railways with interconnected microgrid

Abstract

The increasing demand for sustainable and reliable railway transportation has spurred innovations in traction power supply systems, particularly through the integration of microgrids. This talk presents a comprehensive overview of resilient traction power supply systems in modern railways, emphasizing the role of interconnected microgrids in enhancing operational reliability, energy efficiency, and system flexibility.

We explore key architectural advancements that enable bi-directional power flow, dynamic load management, and fault tolerance. Particular attention is given to the coordination between railway substations, renewable energy sources, energy storage systems, and intelligent control frameworks that form the backbone of interconnected microgrids. Case studies and simulation insights highlight how these systems can effectively mitigate power outages, reduce dependency on centralized grids, and support the transition toward greener railway networks. The speech concludes with a discussion on current challenges, future research directions, and policy implications for large-scale deployment.

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.

Oral Session 1

KNUT Special Session 1

13:30~14:50 Tue, August 19, 2025

Room 1

Chair: Prof. Jeong Won Kang (KNUT, Korea)

OS1-1 *13:30~13:50*
Web Based Boarding and Alighting Verification System for Safety Personnel on Driverless Trains
Seung Yong Won and Jeong Won Kang†
Korea National University of Transportation, Korea

OS1-2 *13:50~14:10*
A study on the Continuous Implementation of Position Display of Trains with Communication Disruption in RF-CBTC Train Control System
Wook Jin Hwang and Jeong-Won Kang†
Korea National University of Transportation, Korea

OS1-3 *14:10~14:30*
A Study on Integrated Operation of VHF and Complex Communication Facilities for Railway
Seon-Kyo Kim, Dong-Hoon Park, and Jeong-Won Kang†
Korea National University of Transportation, Korea

OS1-4 *14:30~14:50*
A Study on the Development of a Search App for Urban Railway Emergency Recovery Equipment
Seok-Woo Im, Jong-Hak Park, and Jeong-Won Kang†
Korea National University of Transportation, Korea

Oral Session 2

KNUT AI Session

13:30~14:50 Tue, August 19, 2025

Room 2

Chair: Prof. Jeonghwan Gwak (KNUT, Korea)

OS2-1 *13:30~13:50*

Performance Comparison of Full Fine-Tuning and Parameter-Efficient Fine-Tuning of BioBERT for Pathogenicity Classification on the ClinVar Dataset

Namjung Kim, Changjoon Park, Xufeng Hu, Junhwi Park, Jaehyun Lee, and Jeonghwan Gwak†

Korea National University of Transportation, Korea

OS2-2 *13:50~14:10*

Performance Analysis of PAC-Bayesian Meta-Learning in Few-Shot Medical Image Classification

Changjoon Park, Namjung Kim, Xufeng Hu, Junhwi Park, Jaehyun, Lee, and Jeonghwan Gwak†

Korea National University of Transportation, Korea

OS2-3 *14:10~14:30*

A Parameter-Efficient Feature Fusion Framework for Breast Tumor Segmentation with Ambiguous Boundaries

Xufeng Hu, Namjung Kim, Changjoon Park, Junhwi Park, Jaehyun Lee, and Jeonghwan Gwak†

Korea National University of Transportation, Korea

OS2-4 *14:30~14:50*

A MAML-Based Multi-Task Learning Approach for Few-Shot Disease Classification on Chest X-Ray Datasets

Junhwi Park, Changjoon Park, Namjung Kim, Xufeng Hu, Jaehyun Lee, and Jeonghwan Gwak†

Korea National University of Transportation, Korea

Oral Session 3
Future Electrics

15:30~16:30 Tue, August 19, 2025

Room 1

Chair: Dr. Nguyen Nho Khai (HCMUT, Vietnam)

OS3-1 *15:30~15:50*
Design of PI controller based on neural network trained through reinforcement learning for PMSM speed control
Trung Khanh Cong Do[1], Tien-Loc Tien Le[2†], and Tam Minh Nguyen[1†]
[1]Ho Chi Minh City University of Technology and Education, Vietnam, [2]Lac Hong University, Vietnam

OS3-2 *15:50~16:10*
Study on the harmonic countermeasures for passive line reactor for AC single-phase system
Changdae Joo[1], Taekue Kim[1†], Donha Hwang[2], and Suji Han[1]
[1]Changwon National University, Korea, [2]Korean Electrotechnology Research Institute, Korea

OS3-3 *16:10~16:30*
Design of Reactive Power Compensators for a Large-Scale Offshore Wind Farm in Compliance with the Korean Grid Code
MINH CHAU DINH[†], Byeong-Soo Go, Ga-Eun Jung, Jae-In Lee, and Seok-Ju Lee
Changwon National University, Korea

Oral Session 4

Artificial Intelligence

15:30~16:30 Tue, August 19, 2025

Room 2

Chair: Prof. Young Park (HNU, Korea)

OS4-1 *15:30~15:50*

A Study on Estimating Reasonable Insurance Price Based on the XGBoost Algorithm

Jooho Park†, Semyung Park, and Juhee Choi

Sangmyung University, Korea

OS4-2 *15:50~16:10*

Artificial Intelligence Study on Dysarthria Detection using Acoustic Feature Embedding

Dina Koishiyeva[1], Assel Mukasheva[1†], and Jeong-Won Kang[2†]

[1]Kazakh-British Technical University, Kazakh, [2]Korea National University of Transportation, Korea

OS4-3 *16:10~16:30*

A Study on Parameter-Efficient Fine-Tuning of Large Language Models for Early Sepsis diagnosis

Jaehyun Lee, Junhwi Park, Changjoon Park, Namjung Kim, Xufeng Hu, and Jeonghwa Gwak†

Korea National University of Transportation, Korea

Oral Session 5

HNU Specail Session 1

15:30~16:30 Tue, August 19, 2025

Room 3

Chair: Prof. Wonseok Choi (HNU, Korea)

OS5-1 *15:30~15:50*
Dead-Time Compensation Using Intermediate Switching States in Five-Level ANPC Inverters
Dohyeon Kim and Jungmin Kwon†
Hanbat National University, Korea

OS5-2 *15:50~16:10*
Dynamo-based Rebar Modeling in Building Information Modeling
Hojeong Jeong and Sungjin Kim†
Hanbat National University, Korea

OS5-3 *16:10~16:30*
Development and Application of a Supporting Device for Precise Shape Implementation of Free-form Concrete Panels
Kyeongtae Jeong and Donghoon Lee†
Hanbat National University, Korea

Oral Session 6

KNUT Special Session 2

13:30~14:30 Wed, August 20, 2025

Room 2

Chair: Prof. Jintea Kim (KNUT, Korea)

OS6-1 Development of a Deep Learning Color Recognition Model for the Electrical Railway

13:30~13:50 Dong-Uk Kim and Jeong-Won Kang†

Korea National University of Transportation, Korea

OS6-2 Human Factor-based 3D Verification of Railway Communication Center Design Guide

13:50~14:10 Sanghoon Sun, Yoon-Kyung Lee, and Jeong-Won Kang†

Korea National University of Transportation, Korea

OS6-3 Recent Development of Electrical Railway Vehicles

14:10~14:30 Byung-il Oh, Haram Kim, and Jeong-Won Kang†

Korea National University of Transportation, Korea

Oral Session 7

HNU Specail Session 2

13:30~14:30 Wed, August 20, 2025

Room 3

Chair: Prof. Dongsu Kim (HNU, Korea)

OS7-1 *13:30~13:50*

Sensitivity analysis of building cooling and heating energy simulation using manufacturer-verified performance data: Focusing on variable refrigerant flow (VRF) heat pump system

Seongju Lee, Jaeyoon Koh, Sunglok Do, Jongho Yoon, and Dongsu Kim†

Hanbat National University, Korea

OS7-2 *13:50~14:10*

Comparative Analysis of Residential Building-Applied Renewable Energy Systems Based on Tilt Angle and Climate Variations: (Focusing on Photovoltaic (PV), Solar Thermal (ST), and Photovoltaic Thermal (PVT) Systems)

Junyoung Lee[1], Dongsu Kim[1†], Jaeyoon Koh[2], Ruda Lee[1], Jongho Yoon[1], and Hansol Lim[1]

[1]Hanbat National University, Korea, [2]LG Electronics, Korea

OS7-3 *14:10~14:30*

Evaluation of Multifunctional Adaptive Facade Design for Office Building

Kwanghyun Song[1], Dongsu Kim[1†], Jongho Yoon[1], Dawon Lee[2], Hyojung Kim[2], and Phillip Lee[3]

[1]Hanbat National University, Korea, [2]Junglim Architecture, Korea, [3]Korea Institute of Science and Technology, Korea

Poster Session 1

16:00~17:00 Wed, August 20, 2025

Room : Main Conference Hall

Chair: Dr. Chulmin PARK (Korea Railroad Research Institute, Korea)
Prof. Jeamoon Kim (KNUT, Korea)
Prof. Dieu Vo (HCMUT, Vietnam)

PS1-01 **A Study on Enhancing User Safety and Convenience through the Introduction of Dynamic Car Number Indicators and Passage Guidance Indicators on Railway Platforms**
Junoh Kim and Jeong Won KANG†
Korea National University of Transportation, Korea

PS1-02 **A Study on the Design of HILS system for Controller Performance Verification Using a One-Link Robot**
Juyeon Hyun, Donghwi Son, Taekue Kim†, and Seungkyu Park
Changwon National University, Korea

PS1-03 **Output Estimation Methods of LCC Resonant Converter for High Voltage Application**
Seung-Ho Song†, Ui-Chang Mun, and Sang-Min Lee
Korea National University of Transportation, Korea

PS1-04 **Output Estimation Method of DCM Resonant Converter for Filament Power Supply**
Seung-Ho Song†, Pyeong-Kang Kim, and Sang-Min Lee
Korea National University of Transportation, Korea

PS1-05 **Design and Analysis of Cryogenic Flexible Hoses for Liquid Hydrogen Transfer in Aircraft Electrical Propulsion Systems**
BYEONGSOO GO, WONMI JUNG, and SEOKJU LEE†
Changwon National University, Korea

PS1-06 **Review of DSO operation necessity and overseas operation plan due to increased DER**
Iseul Nam†
Korea Electrical Safety Corporation, Korea

PS1-07 **A Study on the Mitigation of De-wiring and Arc Faults in Rigid Overhead Conductor Rail (R-Bar) Systems for Electrified Railway Tunnels**
Chan Hee Won, Yong Eun Choi, Sang Nyeong Park, Chi Won Sung, and Jae Moon Kim†
Korea National University of Transportation, Korea

PS1-08 Numerical and Experimental Analysis of DC Corona-Streamer Discharges in a Tip-Plate Electrode Configuration
Hyun-Min Kang[1], Don-Ha Hwang[2], and Ho-Young Lee[1,†]
[1]*Changshin University, Korea,* [2]*Korea Electrotechnology Research Institute, Korea*

PS1-09 FDS Based Numerical Analysis of Fire Propagation in Electrical Cable Trays Using a FLASH-CAT Based Pyrolysis Model
Hyun-Min Kang[1], Jaiho Lee[2], Young-Seon Moon[2], Ho-Young Lee[1,†]
[1]*Changshin University, Korea,* [2]*Korea Institute of Nuclear Safety, Korea*

PS1-10 Research on control strategies considering the energy efficiency of series hybrid combat vehicles
Suji Han, Taekue Kim[†], and Changdae Joo
Changwon National University, Korea

PS1-11 Integration of HVDC Technology into Vietnam's 500 kV Grid: A Case Study of the Quang Trach–Pho Noi Transmission Line
Tran Tuan Anh[1,†], Nguyen Phuc Khai[1,†], and Nguyen Tan Minh Trung[2]
[1]*Faculty of Electrical and Electronics Engineering, Ho Chi Minh City University of Technology, Viet Nam,* [2]*Power Engineering Consulting Joint Stock Company 2, Viet Nam*

PS1-12 Development of an EBSD-Based Method for Root Cause Analysis of Electrical Fires
Kim JeongHwan[†], Kim Jeongki, Choi Chiwoo, and Park Kwangmuk
Korea Electrical Safety Corporation, Korea

PS1-13 Development of an Arc Flash Hazard Calculation Application for Enhancing Electrical Work-site Safety
Jeong-Gi Kim[†], Jin-Sik Lee, Jae-Hyun Kim, and Jeong-Hwan Kim
Korea Electrical Safety Corporation, Korea

PS1-14 Enhancing Electrical Fire Cause Analysis through Explainable AI: Molten Mark Classification and Interpretability using CNN and Grad-CAM
chi-woo choi[†], jeong-hwan kim, kwang-muk park, and Jeong-Chay Jeon
korea electricity safety corporation, Korea

PS1-15 Reconfiguring the distribution power network considering the reliability of power distribution grids in Cao Lanh city
Quang Dang Pham[1,†], Khai Phuc Nguyen[1,†], and Hung Thanh Phan[2]
[1]*Ho Chi Minh City University of Technology, Viet Nam,* [2]*Dong Thap Power Company, Viet Nam*

PS1-16 A Study on the Generation of Common Mode Voltage Based on ESS Operating Conditions
Yong Eun Choi, Sang Nyeong Park, Chi Won Sung, Chin Young Chang, and Jae Moon Kim[†]
Korea National University of Transportation, Korea

PS1-17 Evaluation of BO-LID Recovery Characteristics in PV Modules under Various DH Recovery Conditions

YoungHo Cho[1], WonWook Oh[2], JinHo Choi[2], KiBeak Hong[2], and Donggun Lim[3,†]
[1]Chungbuk Technopark, Korea National University of Transportation, Korea, [2]Chungbuk Technopark, Korea, [3]Korea National University of Transportation, Korea

PS1-18 Evaluation of Acceleration Factors and Equivalent Lifetimes of PV Modules Using EVA and POE Encapsulants under DH and IAC Test Conditions

YoungHo Cho[1] and Donggun Lim[2,†]
[1]Chungbuk Technopark, Korea National University of Transportation, Korea, [2]Korea National University of Transportation, Korea

PS1-19 Development of a Diagnostic Testbed for System-Level Degradation Evaluation of UPS under Electrical Stress Conditions

Young-chan Kim, Ji-yeon Kim,Gun-ho Yi, and Sun-bae Bang[†]
Korea Electrical Safety Corporation, Korea

PS1-20 An Adaptive Threshold Algorithm for Incipient Fault Detection in ESS based on Insulation Resistance Dynamics

Young PARK[1,†], Hunseo Lee[2], JiHun Ha[1], and Jiwon Lim[1]
[1]Hanbat National University, Korea, [2]KOREA ELECTRICAL SAFETY CORPORATION, Korea

PS1-21 Analysis of Global and Domestic Trends in Autonomous Train Technology and Its Future Applications

Min Gyu LEE, Jae Moon KIM[†], Yong Eun CHOI, Sang Nyeong PARK, and Chi Won SUNG
Korea National University of Transportation, Korea

PS1-22 Analysis of Degradation Factors in Lithium-ion Batteries across Cell, Module, Rack, and ESS System Levels

HyeRyeon Jeon, You-Na Kim, Young-Kyu Mo, Min Hwang, and Young-Seok Kim[†]
KESCO, Korea

PS1-23 Self-powered IoT sensor enabled by a uniform double-layer triboelectric nanogenerator using P2VP@$BaTiO_3$ nanoparticles

Changduk Yang[†]
Ulsan National Institute of Science and Technology (UNIST), Korea

PS1-24 Design of an Integrated Automatic Fire Suppression System for Thermal Runaway Events in ESS

park Hyeong Gyoon[†], Kim Dong Min, and Go Eun Sung
Hanbit Safety Engineering Corporation, Korea

PS1-25 Comprehensive evaluation of L2 normalization with various image transformations

Jong-Nam Kim[1], Dina Koishiyeva[2], Kuanysh Alipbayev[3], Adil Mukhamedgali[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan, [3]Almaty University of Power Engineering and Telecommunications, Kazakhstan

PS1-26 Deep learning analysis on respiratory sound with multi-head attention

Donguk Kim[1], Dina Koishiyeva[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-27 Deep learning analysis of loss function of colon polyp segmentation under class imbalance

Jonghee Kim[1], Dina Koishiyeva[2], Alibek Bissembayev[2], Assel Mukasheva[2], and Jeong Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-28 Artificial intelligence study on medical image segmentation

Junoh Kim[1], Dina Koishiyeva[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-29 Neural network algorithms for data preprocessing on brain tumor detection

Haram Kim[1], Adeliya Bekturova[2], Alibek Bissembayev[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-30 Artificial Intelligence Comparative Analysis of the Predictive Risk Assessment Modeling Technique

Anel Tolkynbekova[1], Dina Koishiyeva[1], Alibek Bissembayev[1], Dinargul Mukhammejanova[2], Assel Mukasheva[1,†], and Jeong-Won Kang[3,†]

[1]Kazakh-British Technical University, Kazakhstan, [2]International Information Technology University, Kazakhstan, [3]Korea National University of Transportation, Korea

PS1-31 A Study on the Optimization Efficiency of Software Development with Low-Code Platforms

Hae San Park[1], Erdana Seitzhan[2], Alibek Bissembayev[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-32 Evaluating Low-Code Development Platforms using A MULTI-MOORA Approach

Seonkyo Kim[1,†], Danial Serekov[2], Alibek Bissembayev[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-33 Analysis of Kazakhstan's sectoral international trade

Sanghoon Sun[1], Yermakhan Kuanyshbekov[2], Alibek Bissembayev[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS1-34 Deep learning analysis on Skin Lesions

Byungil Oh[1], Dina Koishiyeva[2], Alibek Bissembayev[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]

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Poster Session 2

17:00~18:00 Wed, August 20, 2025

Room : Main Conference Hall

Chair: Prof. SangYule Choi (Induck Univ, Korea)
Prof. Nho Nguyen Van (HCMUT, Vietnam)
Dr. Hyungchul Kim (Korea Railroad Research Institute, Korea)

PS2-35 **EEG Signals Spectral Analysis for Parkinson's Disease Classification**
Chanhee Weon[1], Dina Koishiyeva[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]
[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS2-36 **Machine Learning Study on Glaucoma Detection in Fundus Imaging**
Sokwoo Lim[1], Dina Koishiyeva[2], Assel Mukasheva[2], and Jeong-Won Kang[1,†]
[1]Korea National University of Transportation, Korea, [2]Kazakh-British Technical University, Kazakhstan

PS2-37 **Real-Time Position Control of a 3-Axis Robot Using PC-Based Powerlink Communication**
Donghwi Son, Taekue Kim[†], and juyeon Hyun
Changwon National University, Korea

PS2-38 **Systematic Collection and Preprocessing of Power System Data for Deep Learning-Based Fault Diagnosis**
Dong-Hee Yoon[†]
Korea National University of Education, Korea

PS2-39 **Load Current Feedforward Compensation using Deep Learning Technology for Auxiliary Power Supply Systems in Railway Vehicles**
Yongki Kim[1], Kang-moon Park[2,†], Jeong Won Kang[2], and Hag-Wone Kim[2]
[1]University of Colorado, Boulder USA, [2]Korea National University of Transportation, Korea

PS2-40 **A study on replacement priorities selection by railway route and section by performance evaluation of electrical equipment**
Hyungchul Kim[†]
Korea Railroad Research Institute, Korea

PS2-41 **Development of an Automatic Cleaning System for Rigid Overhead Contact Lines**
Chulmin PARK[1], Sangjin SON[2], and Young PARK[3,†]
[1]Korea Railroad Research Institute, Korea, [2]Myeong-sung Rollingstock & Plant Co. Ltd, Korea, [3]Hanbat National University, Korea

PS2-42 Development of a Mobile App-Integrated Smart Power Shutdown and Restoration System for Railway Traffic Control Innovation
Hae-San Park and Jeong-Won Kang†
Korea National University of Transportation, Korea

PS2-43 A study on continuous implementation of position display of CBTC train control
Wook jin Hwang and Jeong Won Kang†
Korea National University of Transportation, Korea

PS2-44 A Study on the selection of representative models of subway stations using clustering analysis techniques for energy performance evaluation of subway stations
SEUNG KWON SHIN†
Korea Railroad Research Institute, Korea

PS2-45 Proposing Local Mobility Strategies Independent of ITS: A Case Study of Cheonan City
Jaehyung Lee and Jin-Tae Kim†
Korea National University of Transportation, Korea

PS2-46 A Study on the Development of Quantitative and Qualitative Evaluation Methods for Autonomous Shuttle Services
Tae Gun Lee and Jin-Tae Kim†
Korea National University of Transportation, Korea

PS2-47 A Study on the Quantitative Evaluation Methodology of Traffic Signal Status Information (TSI) Service
Jae-Ho Jo and Jin-Tae Kim†
Korea National University Of Transportation, Korea

PS2-48 Analysis of fault characteristics and development of countermeasures for renewable energy-interconnected railway feeding system
Gyu-Jung Cho†
Pai Chai University, Korea

PS2-49 Enhancing Energy Efficiency of DC Railway Using Active Power Control
Chi-Myeong Yun[1], Hosung Jung[2,†], Hanmin Lee[2], Hwanhee Cho[2], and Hyungchul Kim[2]
[1]Samsung C&T, Korea, [2]Korea Railroad Research Institute, Korea

PS2-50 An Advanced Study on the Standardization of Load-Breaking Switch Remote Terminal Unit for Overhead Catenary Systems
Won-Kyu Choi, Jae-Moon Kim†, Yong-Eun Choi, Sang-Nyeong Park, Chi-Won Sung, and Chin-Young Chang
Korea National University of Transportation, Korea

PS2-51 Improvement of Real-time Railway Safety Monitoring and Control System for Osong Railway Test Track Safety Management
Sangahm Kim† and Eun Ju Song
Korea Railway Research Institute, Korea

PS2-52 Study on Human Error Accident Prevention Based on Risk Assessment for Railway Workers
EunJu Song and Sangahm Kim†
Korea Railroad Research Institute, Korea

PS2-53 A Study on Topology Configuration Methods and Regenerative Power Distribution Optimization Techniques for MVDC Railway Electrification Systems
KISUK KIM[1] and HANSANG LEE[2,†]
[1]Ulsan College, Korea, [2]Semyung University, Korea

PS2-54 THD Reduction of Grid-Connected Converters using Spread Spectrum Techniques
Chaehyun Ahn and Mina Kim†
Hanbat National University, Korea

PS2-55 Evaluation of Outdoor Air Intake Range for Enthalpy based Economizer System in a Data Center
Ahmin Jang, Dongsu Kim, Seong Ju Lee, and Sung Lok Do†
Hanbat National University, Korea

PS2-56 Analysis of annual power generation based on the installation angle and orientation of solar power generation systems using Korean typical meteorological data
Eunho Kang, Junyoung Lee, Jongho Yoon, and Dongsu Kim†
Hanbat National University, Korea

PS2-57 Power Management Optimization of BIPV Systems with Energy Storage System Integration
Seong-Han Ryu†
Hanbat National University, Korea

PS2-58 A study on literature review and test method proposal for testing free-form concrete panels under impact loading.
Minje Jo, Kyeongtae Jeong, and Donghoon Lee†
Architecture Engineering, Korea

PS2-59 Design and Technological Trends of BIPV Systems for Sustainable Architecture
Jeong Hun Park†
Hanbat National University, Korea

PS2-60 **Performance Evaluation of Cement Boards Incorporating Graphite Powder and TiO2**
Minje Jo, Kyoungjun Chae, and Sangsoo Lee†
Hanbat National University, Korea

PS2-61 **Core-shell carbon nanofiber-based gas sensor for detection of nitrogen dioxide**
Seokhun Kwon, Dohyeon Kim, Young Park, and Hyunil Kang†
Hanbat National University, Korea

PS2-62 **Synthesis of Laser-Induced Graphene-Based Carbon Nanomaterials for Anode Applications in Lithium-Ion Batteries**
Kangmin Kim, Seokhun Kwon , Seungcheol Yoo, JIhwan Noh, Hyunil Kang, and Wonseok Choi†
Hanbat National University, Korea

PS2-63 **Characteristics of colored glass manufactured using RF magnetron sputtering method for BIPV module application**
Seungcheol Yoo, Jihwan Noh, and Wonseok Choi†
Hanbat National University, Korea

PS2-64 **Comprehensive investigation of rooftop photovoltaic systems in apartment buildings**
RUDA LEE, JONGHO YOON†, DONGSU KIM, and JUNYOUNH LEE
Hanbat National University, Korea

PS2-65 **Performance Evaluation of Transparent Photovoltaic Windows for an Office Building**
Jaewon Kim, Ruda Lee, Kwanghyun Song, Dongsu Kim, and Jongho Yoon†
Hanbat National University, Korea

PS2-66 **Protection Coordination in District Heating CHP Plants with High Renewable Penetration: A Case Study of Outage Events**
Wonsik Moon†, Dong-Il Cho, Yoon-Jin Cho, and June-Hyuk Nam
Soongsil University, Korea

PS2-67 **Fire Detection Based AI Model Using Multi-Sensors (Heat, Smoke, and CO)**
WOO-SEOK LEE[1,†], KYUNG-WAN KOO[1,†], JEE-HWAN AHN[2], JAE-WOO AHN[2], and CHANGHYEK LEE[3]
[1]Hoseo University, Korea, [2]Sedna, Korea, [3]Safesystem, Korea

PS2-68 **Current Status and Challenges for Sustainable Development of Wind Power in Vietnam**
WOO-SEOK LEE[1,†], JUNH-NAM LEE[1], MI-YOUNG KIM[1], MIN-KOO JI[2], and KYUNG-WAN KOO[1,†]
[1]Hoseo University, Korea, [2]West Sea Energy Development, Korea