2025 Research in Adaptive and Convergent Systems (RACS 2025)

November 16-19, 2025
Ho Chi Minh, Vietnam

Final Program

Supported by
The Industrial University of Ho Chi Minh City

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Conference Schedule

Saturday (November. 15)		
14:00~16:30	RACS 26 Business Meeting	TBD
Sunday (November. 16)		
10:00~12:00	Workshop on Special Topics (only for registered participants)	TBD
14:00~16:30	SIGAPP Business Meeting	TBD
16:30~18:30	RACS 26 OC Meeting	TBD
Monday (November. 17)		
Registration is available from Monday to Tuesday		Research Room 3 (Ground floor, Building A)
9:00~11:00	Opening & Keynote Session	Hall E4 (4th floor, Building E)
11:00~11:30	Coffee Break	
11:30~13:00	AM Breakout Session I	Hall E3.2 (3rd floor, Building E)
	AM Breakout Session II	Research Room 4 (Ground floor, Building V)
13:00~14:30	Lunch Time	Multi-functional Room (Ground floor Building A)
14:30~16:00	PM Breakout Session I	Hall E3.2 (3rd floor, Building E)
	PM Breakout Session II	Research Room 4 (Ground floor, Building V)
19:00~21:00	Welcome Reception	Hoa Vien Pilsner Original Restaurant
Tuesday (November. 18)		
9:30~11:00	AM Breakout Session I	Hall E3.2 (3rd floor, Building E)
11:00~11:30	Coffee Break	
11:30~13:00	AM Breakout Session II	Hall E3.2 (3rd floor, Building E)
13:00~14:30	Lunch Time	Multi-functional Room (Ground floor Building A)
14:30~16:00	PM Breakout Session I	Hall E3.2 (3rd floor, Building E)

16:00~16:30	Coffee Break	
16:30~18:00	PM Breakout Session II	Hall E3.2 (3rd floor, Building E)
19:00~21:00	Banquet	Nam A Restaurant
Wednesday (November. 19)		
10:00~12:00	Future RACS Organization Meeting	TBD
12:00~13:30	SIGAPP Wrap-up Meeting	TBD
Conference Ends at 13:30		

Preface

With the expansion of advanced computing and network technologies, innovative solutions are developed to address complex problems in all areas of industry and science, using adaptive and convergent techniques in computer science and engineering, encompassing fields such as programming, software engineering, graphics, databases, wireless networks, security, distributed systems, operating systems, artificial intelligence, quantum computing and so on. The Research in Adaptive and Convergent Systems (RACS) provides a forum for exchanging highly original ideas about systematic, dynamic, practical solutions and aims primarily at researchers who have experience in designing such computing systems and applications. Each year, RACS brings together engineers and scientists from diverse communities with interests in practical computing technologies and creates an environment for them to exchange experimental results, novel designs, works-in-progress, experiences, case studies, and trend-setting ideas.

This volume contains the papers selected for presentation at RACS 2025, which was held at Ho Chi Minh, Vietnam, November 16-19, 2025. There were 59 submissions from 15 countries. Each paper underwent a blind peer review process by three members of the Technical Program Committee (TPC), and 36 regular full papers and 4 short papers were accepted for publication in the proceedings of the conference. The selected papers cover a wide range of topics, including Artificial Intelligence, Security, System Software, and etc.

The RACS 2025 Technical Program Committee was led by two Program Chairs: Dr. Christian Esposito and Dr. Chang Choi. We wish to thank the TPC members for their valuable time and technical input in creating an excellent program. Without their help and contributions, this conference would not have been possible. We would also like to thank the Organizing Committee for their great effort. Our special thanks go to Dr. Ya-Shu Chen (Poster Chair), Dr. Kwanghee Won (Publication Chairs), Dr. Chulwoo Park (Workshop Chair), Dr. Zhongwen Guo, Dr. Junyoung Heo, Dr. Chi-Sheng Shih, Dr. Wei Wang, Dr. Jun Huang, Dr. Juw Won Park (Publicity Chairs), Dr. Trinh Ngoc Nam, Dr. Le Nhat Duy, Dr. Bui Thanh Hung (Local Arrangement Chair), Dr. Hong Min (Financial Chair), and Dr. Joongjin Kook (Registration Chair and Webmaster) for their leadership and excellent work to organize the conference. We are grateful for the generous support given by Industrial University of Ho Chi Minh City. Finally, we thank all of the authors who contributed to this volume and all the attendees of RACS 2025.

Dr. Shih-Hao Hung and Dr. Huynh Trung Hieu
Conference Chairs, RACS 2025

Keynote Speech

Title : Covert & Side Stories:
Toward Molecular Foundation Models: Pre-training GNNs for Effectiveness, Generalizability, and Interpretability

Speaker
O-Joun Lee, The Catholic University, Korea

Abstract
Accurate molecular property prediction requires models that not only achieve high performance but also capture chemically meaningful representations. This keynote will focus on how pre-training Graph Neural Networks (GNNs) can serve as the foundation for learning distinctive, expressive, and interpretable representations of functional groups and molecular substructures. By leveraging large-scale molecular data, pre-trained GNNs can internalize structural and chemical regularities that generalize across diverse tasks from property prediction to interaction modeling and compound screening.

I will discuss recent advances in pre-training objectives and representation learning strategies that enhance expressive power while improving effectiveness, generalizability, and interpretability. Special attention will be given to how pre-trained GNNs can reveal functional group level patterns, bridging predictive accuracy with scientific insight. Case studies will demonstrate applications in molecular property prediction, illustrating how functional group aware representations accelerate progress in computational chemistry, biology, and material science. The talk will conclude with perspectives on the path toward molecular foundation models, emphasizing pre-training methods that unify generalizability, accuracy, and interpretability.

About the Speaker
O-Joun Lee is Assistant Professor at the Catholic University, Korea. Dr. O-Joun Lee is an Assistant Professor at the Department of Artificial Intelligence at The Catholic University of Korea. He holds a Ph.D. in Artificial Intelligence from The Catholic University of Korea, where he also completed his Master's degree in Multimedia and Image Processing. His research focuses on applying advanced artificial intelligence techniques, including Graph Neural Networks (GNNs) and Graph Transformers, to real-world problems in network science, knowledge graphs, social networks, and molecular structure prediction. Dr. Lee has made significant contributions to the development of innovative AI models, particularly in enhancing the understanding and analysis of complex, unstructured data. He is also actively engaged in industry-academia collaborations, bridging the gap between theoretical research and practical applications in AI.

Monday (November 17)

(S.1) Artificial Intelligence 11:30~13:00

Session Chair: Austin Hanson

1. Ground Penetrating Radar Image Analysis for Underground Barrier Detection by Combining YOLOv12 with Channel-wise Attention and Denoising Auto-Encoder, Tien-Bach-Thanh Do, Jun-Hee Cho, Jin-Hyouk Park, Ki-Nam Kim, Luong Vuong Nguyen and O-Joun Lee, Korea

2. Adaptive Block Size Selection for Translating Triton Kernels to RVV, Yuhao Liu, Kevin William, Feige Zhou, Yeh-Ching Chung and Wei Chung Hsu, China

3. FedKLEntropy: Enhancing Federated Learning via Model Entropy and Kullback-Leibler Divergence, Duy-Dong Le, Tuong-Nguyen Huynh and Nhat Tung Le, Vietnam

4. (Short) Meta-Model Design for Spiking Neural Network Simulation, U Hyun Son and Junyoung Heo, Korea

5. (Short) Comparative Study of DNN Profilers, Jeonghwan Oh, Hangyeol Kim, Kyungeun Oh and Jiman Hong, Korea

(S.2) System Software I 11:30~13:00

Session Chair: O-Joun Lee

1. Temperature Wear Leveling: Mitigating Peak Temperature on NAND Flash Memory, Jun Rui Chen, Chin-Hsien Wu, Pi-Cheng Hsiu and Chi Lu, Taiwan

2. Leveraging NVRAM to Improve Read Performance of LSM-tree in Hybrid Storage Systems, Yi-Hua Chen, Yu-Pei Liang, Shuo-Han Chen, Tse-Wei Lee, Wei-Kuan Shih and Yuan-Hao Chang, Taiwan

3. Mitigating the Write-amplification effect of large-scale semi-external graphs on SMR drives, Yi-Syuan Lin, Qi-Cheng Wu, Chih-Xuan Shen, Yu-Pei Liang, Wei-Kuan Shih and Yuan-Hao Chang, Taiwan

4. Reliability Architectures for High-Performance Processors: A Survey and Outlook, Mingsong Lv, Weichen Liu and Nan Guan, China

5. FormalGym: Deep Reinforcement Learning Agent Based Formal Compiler Optimization Framework, Abhilash Majumder, USA

(S.3) System Software II 14:30~16:00

Session Chair: Ya-Shu Chen

1. Toward Efficient Quantum Circuit Simulation with Memory and I/O Reduction through Gate Block Search Algorithm, Chuan-Chi Wang, Chia-Heng Tu and Shih-Hao Hung, Taiwan

2. A Quantum-Inspired QAOA Solver for Knapsack Problems with 100-Qubit Scalability and 100,000x Speedup, Shan-Jung Hou, Chuan-Chi Wang, Po-Hsuan Huang, Chia-Heng Tu and Shih-Hao Hung, Taiwan

3. A Hybrid Compaction and Wear-Leveling Framework for LSM-tree on ZNS SSDs, Yi-Chang Zhang, Yu-Chen Huang, Chia-Yu Yeh, Yu-Ting Lo and Yu-Pei Liang, Taiwan

4. Improving Flash Memory Reliability in High-Density Storage through Data-Aware Page Shuffling, Bo-Jia Wu and Jen-Wei Hsieh, Taiwan

5. (Short) Enhanced Debugging of CPython and Pytorch with GDB, Shinhyeok Pakr, Minjae Kim, Jungsu Park, Juho Park, Jeongyun Lee and Hong Min, South Korea

(S.4) Applications & Security 14:30~16:00

Session Chair: Christian Esposito

1. Linear Regression-Based Cloud Resource Demand Forecasting and Dynamic Scheduling, Yung-Feng Lu, Hung-Ming Chen, Chin-Fu Kuo, Shu-Ping Lu and Hong-Sheng Sun, Taiwan

2. Priority-Aware Multilink Downlink Scheduling with Dynamic MRU Optimization for IEEE 802.11be, Ting-Ting Yang, Hsueh-Wen Tseng and Guan-Lin Chen, USA

3. Interface Alignment Between O-RAN and 3GPP for V2X Communications, Deepak Singh, Muhammad Ashar Tariq, Youngjoon Yang, Mahnoor Ajmal, Chaehyeon Kim, Joohwan Park and Dongkyun Kim, Korea

4. Generalizable IoT Device Detection via Flow-Based Network Traffic Analysis and Random Forest, Alessandro Penna, Christiancarmine Esposito and Valerio Massimi, Italy

5. Linear Regression-Based Cloud Resource Demand Forecasting and Dynamic Scheduling, Yung-Feng Lu, Hung-Ming Chen, Chin-Fu Kuo, Shu-Ping Lu and Hong-Sheng Sun, Taiwan

Tuesday (November 18)

(S.5) Artificial Intelligence & LLM 9:30~11:00

Session Chair: Vo Dang Khoa

1. Metadata-aware RAG for Enforcing Access Control and Metadata-based Filtering: Proof of Concept and Evaluation, Bingxiang Chen and Toni Taipalus, Finland

2. Grade Like a Human: Rethinking Automated Assessment with Large Language Models, Wenjing Xie, Juxin Niu, Chun Jason Xue and Nan Guan, China

3. Leveraging PyTorch for Hardware-Aware Optimization in Efficient Mixture-of-Experts Large Language Model Inference, Mu-Chi Chen, Po-Hsuan Huang, Yanwen Gai, Shao-Chun Ho, Cheng Liang, Yu-Hung Kao, Yu-Kai Hung, Chia-Heng Tu and Shih-Hao Hung, Taiwan

4. Constructing a Companion Animal Disease Knowledge Graph by Utilizing LLMs in Data Preprocessing and Pseudo Annotation, Thien Nguyen, Eun-Soon You, Hyun Woo Kim, Van Thuy Hoang, Luong Vuong Nguyen and O-Joun Lee, Korea

5. Evaluating Small Language Models for Intrusion Detection on Automotive Embedded Platforms, Islam Salah, Junggab Son, Stefan Robila and Daeyoung Kim, USA

(S.6) Artificial Intelligence & Vision 11:30~13:00

Session Chair: Chin-Fu Kuo

1. Discovering Spatial Correlations of Earth Observations for Weather Forecasting using Graph Structure Learning, Hyeon-Ju Jeon, Jeon-Ho Kang, In-Hyuk Kwon and O-Joun Lee, Korea

2. Self-supervised Training for Occlusion Resilience Object Detection Using Temporal Consistency, Yu-Chen Lee, Chi-Sheng Daniel Shih, Hsiung-Jui Lin and Xiaodong Liu, Taiwan

3. Attention-Enhanced Dual Network Framework for Remote Sensing Land Cover Classification, Taimoor Khan, Namgyu Jung, Junho Yoon, Pankoo Kim and Chang Choi, Korea

4. CART: Color-Aided Registration Transformer for Point Cloud Density Enhancement, Yu-Hsin Lin, Chi-Sheng Daniel Shih and Xiaodong Liu, Taiwan

5. A Comparative Analysis of GANs and Adaptive Bayesian Networks for Synthetic Tabular Data Generation, Tze Houng Lee and Xue-Ming Yuan, Singapore

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(S.7) System Software III 14:30~16:00

Session Chair: Hong Min

1. Optimizing Edge Inference with Divide-and-Conquer Segmentation and Multi-Pipeline Coordination, Chin-Fu Kuo, Yu-Yi Chu, Yung-Feng Lu and Shu-Ping Lu, Taiwan

2. Frame-based Synchronization for Multi-view Multi-sensor Fusion in Embedded Systems, Hsiu-Yi Ouyang, Jia-Wei Wu and Ya-Shu Chen, Taiwan

3. Lightweight Cryptography and Physically Unclonable Functions for Secure In-Vehicle Communications, Arcangelo Castiglione, Teresa Elia, Christiancarmine Esposito and Franco Cirillo, Italy

4. User-Centric Adaptive SDS: Data Compression and Erasure Coding for Efficient Ceph Storage, Shu-Ping Lu, Hung-Ming Chen, Chin-Fu Kuo, Yung-Feng Lu and Yen-Ming Chen, Taiwan

5. ECDAR: An Energy-efficient, Channel- and Depth-Aware Adaptive Routing for Underwater Sensor Networks, Cong-Minh Vo, Cong-Hung Tran, Thai-Khanh Pham, Huu-Dung Ngo and Khoa Tran Thi-Minh, Vietnam

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(S.8) (Online) Artificial Intelligence & System Software & Security 16:30~18:00

Session Chair: Jiman Hong

1. (Artificial Intelligence) Multi-agent Auto-Bidding with Latent Graph Diffusion Models, Dom Huh and Prasant Mohapatra, USA

2. (Artificial Intelligence) Reinforcement Learning-Based Energy-Aware Coverage Path Planning for Precision Agriculture, Beining Wu, Zihao Ding, Leo Ostigaard and Jun Huang, USA

3. (Artificial Intelligence) MM-SCORE: A Two-Factor Framework for Auditing Multimodal Dataset Quality, Omeshamisu Anigala, Joy Okolo, Junggab Son and Chulwoo Pack, USA

4. (Artificial Intelligence) Representation Learning for Efficient Deep Multi-Agent Reinforcement Learning, Dom Huh and Prasan Mohapatra, USA

5. (Artificial Intelligence/Short) Structure-and Semantic-based Rationale Distillation: Table and Chart Question Answering in Scientific Documents, Dongyoun Kim, Wonseok Heo, Jee-Hyong Lee and Kwanghee Won, USA

6. (System Software) SPARK:Share-Per-tick Adaptive Redistribution with Kernel-gating, Ki Cheol Park, Yongjin Kwon Kwon, Jae Hoon An and Young Hwan Kim, Korea

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Venue

Industrial University of Ho Chi Minh City - Main Campus

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Google map:

https://www.google.com/maps?ll=10.822159,106.686845&z=16&t=m&hl=en&gl=KR&mapclient=embed&cid=10050830092903781755

Welcome Reception

Hoa Vien Pilsner Original Restaurant – Pho Quang Branch

No. 16 Pho Quang Street, Ward 2, Tan Binh District, HCMC

Public: http://www.hoavien.vn/

Phone: +842839977666

Google map:

https://www.google.com/maps?ll=10.803613,106.666503&z=16&t=m&hl=en&gl=KR&mapclient=embed&cid=14146428153561754759

Banquet

Nam A Restaurant

127 Hong Ha Street, Ward 9, Phu Nhuan District, HCMC

Public: https://nhahangnama.com/

Phone: +84932184199

Google map:

https://www.google.com/maps?ll=10.809689,106.673551&z=17&t=m&hl=en&gl=KR&mapclient=embed&cid=1992990316906022011