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ICUFN 2025

The 16th International Conference on Ubiquitous and Future Networks

July 8 (Tue.) ~ 11 (Fri.), 2025

Iscte - University Institute of Lisbon, Lisbon, Portugal & Virtual Conference

https://icufn.org

Final Program

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The 16th International Conference on Ubiquitous and Future Networks (ICUFN)

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On behalf of the Organizing Committee, we are delighted to welcome you to ICUFN 2025, which will be held in Lisbon, Portugal, and online from July 8 to July 11, 2025. The conference is organized by KICS and technically co-sponsored by the IEEE Communications Society (ComSoc) and the IEICE Communications Society.

Now in its 16th year, ICUFN has grown into a premier international forum for exchanging cutting-edge research and fostering global collaboration in ubiquitous and future communications and networking technologies.

It is our great pleasure to invite you to Lisbon, the stunning capital of Portugal — a city renowned for its picturesque hills, historic charm, and vibrant cultural life. Often called the "City of Seven Hills," Lisbon captivates visitors with its scenic vistas, iconic tile-adorned streets, rich maritime heritage, and thriving innovation and tech ecosystem. With its perfect blend of tradition and modernity, Lisbon offers an inspiring setting for ICUFN 2025.

This year's conference will provide a dynamic platform for researchers, engineers, and industry professionals to exchange ideas, share expertise, and build new collaborations in this fast-evolving field. We have prepared an exciting program, featuring distinguished keynote speakers, engaging tutorials, and cutting-edge technical sessions, all led by prominent experts in the field.

We extend our deep gratitude to all committee members and reviewers whose hard work and dedication made this event possible. In particular, we wish to thank our Technical Program Committee (TPC) Chairs — Professors Sangheon Pack, Xin Wang, Suguru Kameda, Lingyang Song, and Periklis Chatzimisios — along with all TPC members for their outstanding efforts in curating the technical program. We also thank the workshop organizers for developing an excellent series of workshops.

Our special thanks go to ISCTE – Instituto Universitário de Lisboa for their generous support in hosting this year's conference. In particular, we are grateful to Prof. António Fonseca for his dedicated leadership in managing local arrangements.

We sincerely hope you will take this unique opportunity to attend the technical and workshop sessions, engage with the authors, and cultivate new collaborations. The Organizing Committee has worked tirelessly to ensure that ICUFN 2025 will be a rewarding, memorable, and enjoyable experience for all.

We look forward to welcoming you to Lisbon — or online — for ICUFN 2025!

Dong Seog Han
Kyungpook National Univ.,
Rep. of Korea

Catarina Ferreira da Silva
University Institute of
Lisbon, Portugal

Ki-Hyung Kim
Ajou University,
Rep. of Korea

Takeo Fujii
Univ. of Electro-Comms,
Japan

Zary Segall
KTH,
Sweden

Message from TPC Chairs

We are delighted to welcome all of you to Lisbon, Portugal, from July 8th to 11th, 2025, for the sixteenth International Conference on Ubiquitous and Future Networks (ICUFN 2025). ICUFN has been addressing all aspects of computing, networking, communications, and their convergence since 2009. ICUFN 2025 will also be a successful conference, covering a wide range of topics on ubiquitous and future network technologies.

This year, we received submissions from 28 countries worldwide. As a result of a rigorous review process, we selected 74 papers for oral presentations and 66 papers for poster presentations during the main conference. Additionally, we chose 35 workshop papers for presentation. The accepted technical papers have been organized into 15 oral sessions and 4 poster sessions, along with 6 workshops.

The program of ICUFN 2025 is designed to encompass a wide range of wireless and wired communications network technologies. It will cover topics such as cognitive radios, wireless sensor networks, Internet of Things (IoT), broadband wireless communications, future network issues, mobile multimedia networking, and emerging technologies like AI and ML. We are grateful for the contributions of distinguished authors from various parts of the world, whose expertise has greatly enriched this year's program. We would like to express our sincere appreciation to the technical program committee (TPC) members for their active participation and valuable time dedicated to reviewing and selecting the papers. Their efforts have played a vital role in shaping the high-quality content of the conference. Furthermore, we would like to extend our gratitude to our sponsors, KICS and IEEE Communications Society, for their generous support, which has contributed to the success of this event. Our heartfelt thanks go to the Organizing Committee Chairs, Prof. Dong Seog Han, Prof. Catarina Ferreira da Silva, Prof. Ki-Hyung Kim, Prof. Takeo Fujii, and Prof. Zary Segall, for their continuous support and guidance in planning and organizing the conference. Lastly, we hope that all attendees will not only enjoy the splendid program of ICUFN 2025 but also appreciate the beautiful scenery and charm of Portugal, adding to the overall experience of the conference.

Sincerely

Sangheon Pack
Korea Univ.,
Rep. of Korea

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Fudan Univ.,
China

Suguru Kameda
Hiroshima Univ.,
Japan

Lingyang Song
Peking Univ.
China

Periklis Chatzimisios
ATEITHE,
Greece

ICUFN 2025 Program at a Glance

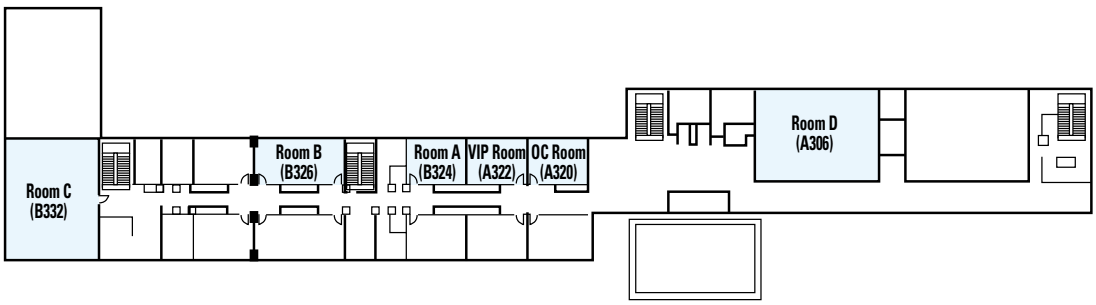
July 7, 2025 (Monday)				
10:00 ~ 12:00	Strategic Planning Workshop on ICUFN (Invitation Only)			
14:00 ~ 17:00	ICUFN Committee Meeting (IAC/SC/OC)			
Room	**Room A (B324)**	**Room B (B326)**	**Room C (B332)**	**Room D (A306)**
July 8, 2025 (Tuesday)				
13:00 ~ 17:00	Registration			
13:30 ~ 15:00	Workshop 1A Smart Connected Mobility	Workshop 1B Big Data and 5G/6G	Workshop 1C SRIoT I	Workshop 1D IV
15:00 ~ 15:30	Coffee Break			
15:30 ~ 17:00	Workshop 2A WSSS	Workshop 2B OCC/FSO	Workshop 2C SRIoT II	Workshop 2D IV
July 9, 2025 (Wednesday)				
09:00 ~ 09:30	Preparation, Registration, and Networking			
Room	**Room D (A306)**			
09:30 ~ 10:30	*Chair: Sangheon Pack (Korea University, Rep. of Korea)* Tutorial 1 Unlocking Ubiquitous, Precise, and Resilient Positioning, Navigation, and Timing through LEO Satellites Prof. José A. López-Salcedo (Universitat Autònoma de Barcelona, Spain)			
10:30 ~ 11:30	*Chair: Insoo Sohn (Dongguk University, Rep. of Korea)* Opening Address Prof. Dong Seog Han, Organizing Committee Chair Welcome Address Prof. Jorge Costa, Vice Rector for Research and Innovation, ISCTE Prof. Selma Boumerdassi, Chair of IEEE Technical Committee on Information Infrastructure (TCIIN) Keynote Speech Achieving High Power Efficiency with Variable Envelope Signals (Prof. Rui Dinis, Nova University of Lisbon, Portugal)			
11:30 ~ 13:30	Lunch (I-Terrace, Iscte campus, Last Entrance 1:00 PM)			
Room	**Room A (B324)**	**Room B (B326)**	**Room C (B332)**	**Room D (A306)**
13:30 ~ 15:00	Oral Session 1A B5G and 6G	Oral Session 1B AI/ML for Wireless Communications	Oral Session 1C UAV and Satellite Communications	Poster Session 1 (P1)
15:00 ~ 15:30	Coffee Break			
15:30 ~ 17:00	Oral Session 2A IoT and CPS	Oral Session 2B QoS and QoE	Oral Session 2C Wireless and Mobile Communications	Poster Session 2 (P2)
18:00 ~ 20:00	Banquet (Viena Room, SANA Metropolitan Hotel)			

※ 2025 Award Ceremony and Editorial Board Meeting of ICT Express Journal (July 9(Wed.) 2:00 pm-3:00 pm / Meeting Room: B322)

July 10, 2025 (Thursday)				
09:00 ~ 09:30	Preparation, Registration, and Networking			
Room	**Room D (A306)**			
09:30 ~ 10:30	*Chair: Pyung Soo Kim (Tech University of Korea, Rep. of Korea)* Tutorial 2 Adaptive and Anonymous WiFi Crowd Sensing: An Easily Deployable, Multi-RAN Solution for Temporary Events (Associate Prof. Rui Neto Marinheiro, Iscte – University Institute of Lisbon, Portugal)			
10:30 ~ 11:30	*Chair: Pyung Soo Kim (Tech University of Korea, Rep. of Korea)* Tutorial 3 Integrated Sensing and Communication for 6G: From Algorithm Development to Hardware Prototyping (Prof. Sunwoo Kim, Hanyang University, Korea)			
11:30 ~ 13:30	Lunch (I-Terrace, Iscte campus, Last Entrance 1:00 PM)			
Room	**Room A (B324)**	**Room B (B326)**	**Room C (B332)**	**Room D (A306)**
13:30 ~ 15:00	Oral Session 3A Emerging Networks and Services	Oral Session 3B Wireless Sensor Networks	Oral Session 3C AI/ML Applications	Poster Session 3 (P3)
15:00 ~ 15:30	Coffee Break			
15:30 ~ 17:00	Oral Session 4A Network Management	Oral Session 4B Emerging Communications	Oral Session 4C Wireless Communications	Poster Session 4 (P4)
July 11, 2025 (Friday)				
09:00 ~ 09:30	Preparation, Registration, and Networking			
Room	**Room A (B324)**	**Room B (B326)**	**Room C (B332)**	
09:30 ~ 11:00	Oral Session 5A Multimedia Networking	Oral Session 5B Autonomous Systems	Oral Session 5C AI/ML for Networks	
Closing				

Iscte – Instituto Universitário de Lisboa Edifício 4

Edifício 4 : 3F Room Map



10:30 ~ 11:30, July 9, 2025 (Wednesday)

Room: A306

Keynote Speech: Achieving High Power Efficiency with Variable Envelope Signals

Chair: Insoo Sohn (Dongguk University, Rep. of Korea)

Speaker: Prof. Rui Dinis, Nova University of Lisbon, Portugal

Abstract:

Future 6G wireless communication systems will require high spectral and energy efficiencies for both economic and environmental reasons. Current amplifiers can have very low amplification efficiency, especially when used with variable-envelope broadband signals like the OFDM-based schemes and single-carrier schemes with compact spectrum (both widely employed in broadband wireless land and satellite communications). In fact, the maximum amplification efficiency for quasi-linear amplifiers (like class-A amplifiers) is 50%. This value drops to 5-10% when high-PAPR signals are employed. By using strongly nonlinear, switched amplifiers (like class D or F amplifiers), we can increase the maximum theoretical amplification to 100%, but the strong nonlinear distortion levels preclude its use with variable-envelope signals.

In this presentation, we make an overview on block transmission techniques for broadband wireless communications, as well as current power amplification schemes, with their advantages and limitations when employed with variable-envelope signals. We also present an innovative and highly disruptive amplification scheme named quantized digital amplification (QDA), which can overcome those limitations. It is shown that the QDA allows a quasi-linear amplification of variable-envelope signals like OFDM ones, while maintaining very high energy efficiency, being able to fulfill the spectral masks and EVM (Error Vector Magnitude) requirements of the most demanding wireless systems, including OFDM-based MIMO systems employing large QAM constellations. The power efficiency gains of the QDA allow significant improvements in bit rates and coverage for wireless systems in general.

Biography

Rui Dinis received the Ph.D. degree from IST, Technical University of Lisbon, Portugal, in 2001 and the Habilitation in Telecommunications from FCT, Nova University of Lisbon (UNL) in 2010 where he is a Full Professor. Rui Dinis is also researcher at IT (Instituto de Telecomunicações). During 2003 he was a visiting professor at Carleton University, Ottawa, Canada.

Rui Dinis is an IEEE ComSoc Distinguished Lecturer and an IEEE VTS Distinguished Speaker. He is or was editor at several major IEEE journals (IEEE TWC, TCOM, TVT and OJ-COMS) and at Elsevier Physical Communication and Hindawi ISRN Communications and Networking. He was also a guest editor for multiple special numbers in several journals.

He was involved in the organization of IEEE conferences, namely several VTC and GLOBECOM, and is a member of several technical committees of IEEE Communications Society.

Rui Dinis has been actively involved in several international research projects in the broadband wireless communications area. He has 30 PhD students (current and past), published 7 books, over 200 journal papers and book chapters and over 400 conference papers (of which 5 received best papers' awards), and has over 20 patents.

He was involved in pioneer projects on the use of mm-waves for broadband wireless communications and his main research activities are on modulation and transmitter design, nonlinear effects on digital communications and receiver design (detection, equalization, channel estimation and carrier synchronization), with emphasis on frequency-domain implementations, namely for MIMO systems and/or OFDM and SC-FDE modulations. He is also working on cross-layer design and optimization involving PHY, MAC and LLC issues, as well as indoor positioning techniques.

09:30 ~ 10:30, July 9, 2025 (Wednesday)

Room: A306

Tutorial 1: Unlocking Ubiquitous, Precise, and Resilient Positioning, Navigation, and Timing through LEO Satellites

Chair: Sangheon Pack (Korea University, Rep. of Korea)

Speaker: José A. López-Salcedo.(Professor at Universitat Autònoma de Barcelona, Spain)

Abstract:

The emergence of low Earth orbit (LEO) satellite constellations is opening new frontiers for applications and services that rely on positioning, navigation, and timing (PNT). This tutorial will explore how LEO satellites are being leveraged to deliver ubiquitous, precise, and resilient positioning capabilities, serving as a complementary or alternative solution to conventional global navigation satellite systems (GNSS).

The tutorial will begin by presenting the fundamentals and motivations behind LEO-based positioning, emphasizing its key advantages over traditional GNSS, such as stronger received signal power, rapid satellite geometry changes, and the use of large constellations of small, low-cost satellites. It will then introduce the distinction between opportunistic and dedicated LEO positioning approaches, showcasing recent experimental results and highlighting ongoing initiatives.

Finally, the tutorial will look ahead to future developments, examining potential synergies with emerging 5G/6G non-terrestrial networks (NTN) and the prospective deployment of multi-layer PNT architectures that combine GNSS, 5G/6G NTN, and LEO-PNT systems.

Biography

José A. López-Salcedo (Senior Member, IEEE) received the M.Sc. and Ph.D. degrees in telecommunication engineering from the Universitat Politècnica de Catalunya (UPC), Barcelona, Spain, in 2001 and 2007, respectively. Since 2006, he is with Universitat Autònoma de Barcelona (UAB), where he is a Professor. He has held several visiting appointments, including at the University of California, Irvine as a Fulbright visiting researcher, the University of Illinois Urbana-Champaign, Hanyang University in Korea, and the European Commission Joint Research Center in Italy. He has been the principal investigator of more than 30 research projects, most of them funded by the European Space Agency (ESA) on topics dealing with signal processing for Global Navigation Satellite Systems receivers. In the recent years, he has been involved in several European activities dealing with the use of low Earth orbit (LEO) satellites for either opportunistic or dedicated positioning, navigation and timing (PNT). His research interests lie in the field of signal processing for communications and navigation, with emphasis on the convergence between GNSS, 5G/6G and LEO-PNT satellites. He serves as Chair of the Spanish Chapter of the IEEE Aerospace and Electronic Systems Society (AESS), member of the Editorial Committee of the Korean Institute of Positioning, Navigation, and Timing, and elected member of the IEEE Signal Processing Society's Sensor Array and Multichannel Technical Committee.

09:30 ~ 10:30, July 10, 2025 (Thursday)

Room: A306

Tutorial 2: Adaptive and Anonymous WiFi Crowd Sensing: An Easily Deployable, Multi-RAN Solution for Temporary Events

Chair: Pyung Soo Kim (Tech University of Korea, Rep. of Korea)

Speaker: Associate Prof. Rui Neto Marinheiro, Iscte – University Institute of Lisbon, Portugal

Abstract:

Tourist overcrowding significantly affects visitors' experiences, local residents' quality of life, and environmental sustainability. Traditional monitoring approaches based on static sensors are limited, especially during temporary events with unpredictable crowd dynamics. To address these challenges, a flexible and adaptive solution for real-time crowd monitoring is being developed through ongoing funded projects and will be presented in this tutorial. The system employs low-cost, scalable sensors capable of detecting mobile devices through Wi-Fi signals, while effectively handling MAC address randomization. These sensors support communication over multiple radio access networks (multi-RAN), dynamically optimizing connectivity and enabling deployment

in suboptimal locations. To enhance detection accuracy, the system includes an adaptive calibration mechanism using drone-based sensitivity mapping and automatic parameter optimization. A semi-supervised machine learning fingerprinting approach is also under development to ensure resilience to device updates and new models, supported by data gathered in a controlled Faraday cage environment. Ongoing pilot deployments during temporary public events organized by the Municipality of Lisbon are validating the system's flexibility and ease of use. To support broader adoption, the project will produce comprehensive documentation, tutorials, and instructional videos, facilitating operational autonomy for municipalities, law enforcement, and civil protection authorities.

Biography

Rui Neto Marinheiro obtained his PhD in Electronics and Computer Science from the University of Southampton, UK, in July 2001. Since then, he has been teaching at Iscte – University Institute of Lisbon, where he is currently an Associate Professor and Director of the Degree in Telecommunications and Computer Engineering. He has extensive teaching experience in computer networks, internet of things, and network security, and regularly contributes to international summer schools, including recent editions at UESTC (China) and IBA (Pakistan). As a researcher at the Instituto de Telecomunicações, he has led or contributed to several national and international projects (e.g. RESETTING, Agentcities, NEUF) and currently leads MoniCrowd, a funded project on crowd monitoring in Lisbon. He has published widely and helped organize multiple scientific events, with research interests spanning network architectures, mobility, IoT communication systems, software-defined networks, and medium access control protocols.

10:30 ~ 11:30, July 10, 2025 (Thursday)

Room: A306

Tutorial 3: Integrated Sensing and Communication for 6G: From Algorithm Development to Hardware Prototyping

Chair: Pyung Soo Kim (Tech University of Korea, Rep. of Korea)

Speaker: Prof. Sunwoo Kim, Hanyang University, Rep. of Korea

Abstract:

Integrated Sensing and Communication (ISAC) is gaining prominence as we transition towards 6G communication. Global research initiatives encompass algorithm development and hardware prototyping. This presentation provides an up-to-date overview of ongoing ISAC research, encompassing diverse sensing, radar algorithms, and beam management techniques. Additionally, hardware prototypes for the 6G ISAC will be showcased. The presentation delves into wireless localization and sensing in both far-field and near-field regions. Concluding remarks will highlight recent advancements in wireless sensing utilizing Rydberg atomic receivers.

Biography

Sunwoo Kim received his B.S degree from Hanyang University, Seoul, Korea in 1999, and his Ph.D. degree, in 2005, from the Department of Electrical and Computer Engineering, University of California, Santa Barbara. Since 2005, he has been working in the Department of Electronic Engineering at Hanyang University, Seoul, Korea, where he is currently a professor and the department chair. He is now the director of Beyond-G Global Innovation Center at Hanyang University and was the director of the 5G/Unmanned Vehicle Research Center, funded by the Ministry of Science and ICT of Korea. He was also a visiting scholar to the Laboratory for Information and Decision Systems, Massachusetts Institute of Technology, and SPCOMNAV group at Universitat Autonoma de Barcelona, Spain. He served as an associate editor of IEEE Transactions on Vehicular Technology and is a senior member of the IEEE. His research interests include wireless communication, sensing, and localization.

July 8, 2025 (Tuesday)

Workshop 1A: Smart Connected Mobility

Chair: Ji-Woong Choi (DGIST, Rep. of Korea)

Room B324, Time 13:30 ~ 15:00

[W1A-1] Channel Charting-Based Vehicle Position Estimation in Real-World Coordinates of Lanes
Hanyoung Park and Yongjae Jang (Daegu Gyeongbuk Institute of Science and Technology, Rep. of Korea); Ji-Woong Choi (DGIST, Rep. of Korea)

[W1A-2] Dynamic Load Balancing Framework for Compute-Network Resource Integration in MEC-Assisted Autonomous Vehicles
Jeonghwan Kim, Juho Song, Hoon Sung Chwa and Ji-Woong Choi (DGIST, Rep. of Korea); Jeongho Kwak (Korea University, Rep. of Korea)

[W1A-3] Integrating ROS 2 and Physical AI: Architecture and Challenges
Kyung-Joon Park, Sanghoon Lee and Jiyeong Chae (DGIST, Rep. of Korea)

[W1A-4] Post-Quantum Cryptography Migration on V2X Certificate Using KpqC Algorithms
Yujin Seo and Young-Sik Kim (Daegu Gyeongbuk Institute of Science and Technology (DGIST), Rep. of Korea)

[W1A-5] Multi-Agent Proximal Policy Optimization Based Redundancy Mitigation Rule for C-V2X Collective Perception
Kiwoong Park and Han-Shin Jo (Hanyang University, Rep. of Korea)

Workshop 1B: Big Data and 5G/6G

Chair: Sungrae Cho (Chung-Ang University, Korea)

Room B326, Time 13:30 ~ 15:00

[W1B-1] Training Signal Design for Channel Estimation in Monostatic Multiantenna Backscatter Communication
Seunghyun Oh (Kyung Hee University - Global Campus, Rep. of Korea); Yun Hee Kim (Kyung Hee University, Rep. of Korea)

[W1B-2] A Survey on Noise Detection and Correction in Semantic Communication
Seongjin Choi, Junsuk Oh, Tung Son Do, Seonghun Hong, Juyoung Kim and Sungrae Cho (Chung-Ang University, Rep. of Korea)

[W1B-3] Survey on Challenges of Semantic Communication for Autonomous Vehicles
Juyoung Kim, Seungchan Lee and Gahyun Kim (Chung-Ang University, Rep. of Korea); Wonjong Noh (Hallym University, Rep. of Korea); Sungrae Cho (Chung-Ang University, Rep. of Korea); Dinh Ton That (Chung Ang University, Rep. of Korea)

[W1B-4] A Survey on Intelligent Traffic Steering Techniquesin O-RAN
Seungchan Lee, Seongjin Choi, Dongwook Won, Jaemin Kim, Sungrae Cho and Quang Tuan Do (Chung-Ang University, Rep. of Korea)

Workshop 1C: SRIoT I

Chair: Takeo Fujii (The University of Electro-Communications, Japan)

Room B332, Time 13:30 ~ 15:00

[W1C-1] Out-of-Band Leakage Suppression in Packet-Based WPT via Waveform Shaping and Null-Steering
Mitsuki Muroi and Shuma Okita (Tokyo University of Science, Japan); Takahiro Matsuda (Tokyo Metropolitan University, Japan); Tomotaka Kimura (Doshisha University, Japan); Takefumi Hiraguri (Nippon Institute of Technology, Japan); Kazuki Maruta (Tokyo University of Science, Japan)

[W1C-2] Frequency Spectrum Sharing Between IEEE 802.11ah and LPWA in 920 MHz Band
Ryota Okuwaki, Keita Aoki and Osamu Takyu (Shinshu University, Japan); Koichi Adachi (Keio University, Japan); Mai Ohta (Kogakuin University, Japan); Takeo Fujii (The University of Electro-Communications, Japan)

[W1C-3] Indoor Positioning Using Machine Learning with Wi-Fi FTM and RSSI
Koki Nakamura (Mitsubishi Electric Corp., Japan); Takashi Ookawahara and Yudai Sunagozaka (National Institute of Technology, Toyama College, Japan); Rei Hirata (The University of Electro-Communications, Japan); Atsushi Koizumi (National Institute of Technology, Toyama College, Japan); Takenori Sumi (Mitsubishi Electric Corporation, Japan); Jianlin Guo (Mitsubishi Electric Research Laboratories, USA); Yukimasa Nagai (Mitsubishi Electric Corp., Japan); Hiroshi Oguma (National Institute of Technology, Toyama College, Japan)

[W1C-4] Energy-Efficient Optimization in O-RAN for Intelligent IoT Systems
Mukesh Kumar Maheshwari (Bahria University, Pakistan); Alessandro Raschellà, Michael Mackay, Ahmed Sabah Mohammed and Amer Salih (Liverpool John Moores University, United Kingdom (Great Britain))

[W1C-5] USRP Implementation of Synchronized SS-CDMA Communication Function Using Wi-Wi: Evaluation in a Wireless Environment
Tomokazu Watanabe, Toshiki Ouchi, Serena Akasaka, Masataka Miyake and Suguru Kameda (Hiroshima University, Japan)

Workshop 1D: IV

Chair: Dong Seog Han (Kyungpook National Univesity, Rep. of Korea)

Room A306, Time 13:30 ~ 15:00

[W1D-1] Multi-Layer Depth Weighted Fusion Approach for Speech Emotion Recognition
Samuel Kakuba and Dong Seog Han (Kyungpook National University, Rep. of Korea)

[W1D-2] Real-Time 3D Gaze Estimation Using Dual-Stream EfficientNet with LSTM and Attention Modules on RGB-D Data
Hafiz Ahmad Qadeer and Min Young Kim (Kyungpook National University, Rep. of Korea)

[W1D-3] Enhancing User Acceptance in Autonomous Vehicles: Integrating Scene Understanding and Emotion Recognition
Savina Jassica Colaco (Kyungpook National University & Center for ICT & Automotive Convergence, Rep. of Korea); Safaa Abdullahi Moallim Mohamud (Kyungpook National University & Center for ICT and Automotive Convergence, Rep. of Korea); Minjin Baek, Seung Woo Eun and Dong Seog Han (Kyungpook National University, Rep. of Korea)

[W1D-4] Initial Pose Estimation of an Autonomous Mobile Robot via Feature Object Learning and Recognition
Min Young Kim, Jun Seok Oh, Jun Hyung Park and Da Yeon Lee (Kyungpook National University, Rep. of Korea)

Workshop 2A: WSSS

Chair: Junbeom Hur (Korea University, Rep. of Korea)

Room B324, Time 15:30 ~ 17:00

[W2A-1] Development of an Artificial Intelligence Device Integrated Control and Management System for Software-Defined Camera
Jinhong Kim (Electronics and Telecommunications Research Institute (ETRI), Rep. of Korea); Yun-Won Choi (Electronics & Telecommunications Research Institute, Rep. of Korea); Jang Woon Baek (ETRI, Rep. of Korea); Kil-Taek Lim (Electronics and Telecommunications Research Institute, Rep. of Korea); Dongkyun Kim (Kyungpook National University, Rep. of Korea)

[W2A-2] Analyzing DoS Attack Using Middlebox Amplification on CAPTCHA Server
Lee Hyejin, Woonghee Lee, Junbeom Hur and Kyungrok Choi (Korea University, Rep. of Korea)

[W2A-3] Benchmarking Trust Path Traversal in Swarm Drones: DID + GraphDB vs. RDB Approaches
SeongSu Park (Ajou University, Rep. of Korea); Ki-Hyung Kim (Ajou University, Rep. of Korea)

Workshop 2B: OCC/FSO

Chair: Yeong Min Jang (Kookmin University, Rep. of Korea)

Room B326, Time 15:30 ~ 17:00

[W2B-1] Development of Global Shutter Camera-Based OFDM Modulation for Optical Camera Communication
Ida Bagus Krishna Yoga Utama and Muhammad Alfi Aldolio (Kookmin University, Rep. of Korea); Md Minhazur Rahman (Kookmin University, Rep. of Korea); Yeong Min Jang (Kookmin University, Rep. of Korea)

[W2B-2] Optimized Image Processing for OOK-Based LED Matrix Decoding in High Frame Rate OCC System
Muhammad Alfi Aldolio, Ida Bagus Krishna Yoga Utama and Yeong Min Jang (Kookmin University, Rep. of Korea)

[W2B-3] Autonomous Water Quality Monitoring: Integrating UWB Ad-Hoc Networks, Sensor Calibration, and Kubernetes Cloud Architecture
Sasindu Kavinda Karunarathna, Kusal Tharindu, Malitha Abeysinghe, Kavindu Dilshan and Dinith Primal (Sri Lanka Institute of Information Technology, Sri Lanka); Jayakody Arachchilage Don Chaminda Anuradha Jayakody (Curtin University Technology, Sri Lanka & Sri Lanka Institute of Information Technology, Sri Lanka)

[W2B-4] LifeBeacon: Offline Emergency Communication and Victim Detection System for Disaster Areas
Dhanuka Muhandiramge (Sri Lanka Institute of Information Technology, Sri Lanka & SLIIT, Sri Lanka); Nirmal Widanage, Kalana Bandara, Thisun Senaratna, Dinithi Pandithage and Pradeep Abeygunawardhana (Sri Lanka Institute of Information Technology, Sri Lanka); Sanika K. Wijayasekara (SLTC University, Sri Lanka)

Workshop 2C: SRIoT II

Chair: Suguru Kameda (Hiroshima University, Japan)

Room B332, Time 15:30 ~ 17:00

[W2C-1] Performance Comparison of OTFS and OFDM in High-Mobility Q/V-Band LEO Satellite Communication
Ryo Arimura, Masataka Miyake and Suguru Kameda (Hiroshima University, Japan)

[W2C-2] Indoor Local 5G Radio Map Generation in Non-Line-of-Sight Environments Using Real-Time Spectrum Monitor for Realizing Smart Factory
Taketo Kakimoto, Tatsuya Hatagi, Masataka Miyake and Suguru Kameda (Hiroshima University, Japan)

[W2C-3] Toward 6G Mobility Networks: Cell-Free Cooperative Distributed Beamforming for Interference Management
Jin Nakazato (The University of Tokyo, Japan); Sojin Ozawa, Yuki Sasaki and Mikio Hasegawa (Tokyo University of Science, Japan); Shohei Takaya, Haruki Osaki, Yuki Susukida and Tetsuya Iye (Kozo Keikaku Engineering Inc., Japan); Kazuki Maruta (Tokyo University of Science, Japan)

[W2C-4] Null-Space Expansion and Transmission Power Control for Cell-Free Massive MIMO Systems
Takuto Suzuki, Yuki Sasaki and Kazuki Maruta (Tokyo University of Science, Japan)

[W2C-5] Spectrum Sharing with Beamforming and Area-Aware Resource Management in Private 5G
Masaki Hattori and Takeo Fujii (The University of Electro-Communications, Japan)

[W2C-6] ML-Based Receiver Design for Chirp-Based Asynchronous Pulse Code Multiple Access for Massive IoT
Mayu Selena Horiuchi (Tokyo University of Science, Japan); Ferdinand Peper (National Institute of Information and Communications Technology, Japan); Kenji Leibnitz (NICT, Japan); Naoki Wakamiya (Osaka University, Japan); Maki Arai (Tokyo University of Science, Japan); Won-Joo Hwang (Pusan National University, Rep. of Korea); Dae-Il Noh (Dongyung, Rep. of Korea); Mikio Hasegawa (Tokyo University of Science, Japan)

Workshop 2D: IV

Chair: Dong Seog Han (Kyungpook National Univesity, Rep. of Korea)

Room A306, Time 15:30 ~ 17:00

[W2D-1] Balancing Helmet Detection with Synthetic Data for Class Imbalance
SooYeon Woo (Kyungpook National University, Rep. of Korea); Mi-Seon Kang and Pyong-Kun Kim (ETRI, Rep. of Korea); Kyoungoh Lee (Electronics and Telecommunications Research Institute, Rep. of Korea); Kwangju Kim (ETRI, Rep. of Korea); Kyungwoon Lee (Kyungpook National University, Rep. of Korea)

[W2D-2] Parking State Monitoring via Ultrasonic Sensors: Large Scale Co-Simulation Validation
Marcelo Alves (Bosch Car Multimedia, Portugal); Antonio D. Costa (Universidade do Minho & Centro ALGORITMI, Portugal); Maria João M. R. da C. Nicolau (Universidade do Minho, Portugal & Centro ALGORITMI, Portugal); Filipe Emanuel V. O. Peixoto (University of Minho, Portugal)

[W2D-3] Road Risk Assessment Using Optical Flow and Mono-Depth Networks
Sungsu Song and Soon-Yong Park (Kyungpook National University, Rep. of Korea)

[W2D-4] Study on Influence of Topology in DNN Against Adversarial Attacks
Samaneh Shamshiri and Insoo Sohn (Dongguk University, Rep. of Korea); Juphil Cho (Kunsan National University, Rep. of Korea)

July 9, 2025 (Wednesday)

Session 1A: B5G and 6G

Chair: Sangmi Moon (Korea Nazarene University, Rep. of Korea)

Room B324, Time 13:30 ~ 15:00

[1A-1] Comparative Analysis for Doppler Shift Prediction in High-Speed 5G Scenarios
Damianos Diasakos and Nikolaos Prodromos (University of Patras, Greece); Apostolos Gkamas (University of Ioannina, Greece); Vasileios Kokkinos (University of Patras, Greece); Christos J Bouras (University of Patras - ELKE, Greece); Philippos Pouyioutas (University of Nicosia, Cyprus)

[1A-2] Resource Allocation Algorithm Utilizing Interference Prediction in Local 5G Environments
Takeru Nanjo and Osamu Takyu (Shinshu University, Japan); Kohei Akimoto (Akita Prefectural University, Japan)

[1A-3] Evaluating Security Techniques in 5G MIMO-Based IoT Networks
Chrysostomos Athanasios Katsigiannis, Konstantinos Tsachrelias and Vasileios Kokkinos (University of Patras, Greece); Apostolos Gkamas (University of Ioannina, Greece); Christos J Bouras (University of Patras - ELKE, Greece); Philippos Pouyioutas (University of Nicosia, Cyprus)

[1A-4] Noise Analysis of UWB Numerical Differentiation-Based ToA Estimators in Multipath Environments
Hunyoul Lee and Jaehan Joo (Pusan National University, Rep. of Korea); Suk Chan Kim (Pusan National University, Rep. of Korea & Dept. of EE, Rep. of Korea)

[1A-5] Enhancing MMSE Precoding for Cell-Free Massive MIMO Through Selective Interference Management
Mahnoor Ajmal, Ayesha Siddiqa, Su Kim, Sunghyun Kim and Dongkyun Kim (Kyungpook National University, Rep. of Korea)

Session 1B: AI/ML for Wireless Communications

Chair: Junhee Seok (Korea University, Rep. of Korea)

Room B326, Time 13:30 ~ 15:00

[1B-1] An Efficient CNN-Based Model for Balinese Dance Classification with Hyperparameter Optimization
Nengah Widya Utami and Made Adi Paramartha Putra (Primakara University, Indonesia); Anak Agung Gede Ari Saputra (Indonesia); Gabriel Avelino R Sampedro (University of the Philippines, Philippines & Kumoh National Institute of Technology, Rep. of Korea)

[1B-2] Toward End-to-End Deep Learning for Autonomous Management in Next-Generation Networks
Jose Moura (ISCTE-IUL / IT, Portugal); Pedro Santana (Instituto Universitário de Lisboa (ISCTE-IUL) & Information Sciences and Technologies and Architecture Research Center (ISTAR-IUL), Portugal)

[1B-3] Modular Concept for Addressing Real-World Challenges of Radio Frequency Fingerprinting
Stefan Kunze and Wolfgang Dorner (Deggendorf Institute of Technology, Germany)

[1B-4] Device-Free Occupancy Detection via Wi-Fi CSI and Deep Residual CNN
Seonghyeon Park and Jaehan Joo (Pusan National University, Rep. of Korea); Suk Chan Kim (Pusan National University, Rep. of Korea & Dept. of EE, Rep. of Korea)

[1B-5] Deep Learning-Based Joint Pilot Location and Number Optimization for Channel Estimation in OFDM Systems
Jihoon Park and Seong Ho Chae (Tech University of Korea, Rep. of Korea)

Session 1C: UAV and Satellite Communications

Chair: Eunkyung Kim (Hanbat National University, Rep. of Korea)

Room B332, Time 13:30 ~ 15:00

[1C-1] Enabling Seamless Connectivity: Location Management in 6G Satellite-Aerial-Ground Integrated Networks
Shama Noreen (RPTU, Germany); Hans D. Schotten (University of Kaiserslautern, Germany)

[1C-2] Enhanced Reinforcement Learning Based Multi-Node Cooperative Deployment Strategy for UAV Monitoring
Xureng Ye, Yan Zhang and Kaien Zhang (Beijing Institute of Technology, China); Wenping Bi (University of Tsinghua, China); Zunwen He and Wancheng Zhang (Beijing Institute of Technology, China)

[1C-3] HIL-Based Evaluation of SPRINT: a Protocol Stack for Prioritized Space-Based Wireless Communication
Maleeha Altaf, Ryan S. Adams, Sreejith Vidhyadharan and Ronald A. Fevig (University of North Dakota, USA)

[1C-4] Impact of UAV Wobble on Directivity in UAV-Assisted Communications
Shunsuke Kudo and Takeo Fujii (The University of Electro-Communications, Japan)

[1C-5] Joint Clustering and Uplink Power Control for Cell-Free Massive MIMO in LEO Satellite Networks
Can Zheng, Fitsum Tilahun and Chung G. Kang (Korea University, Rep. of Korea)

Session 2A: IoT and CPS

Chair: Ki-Hyung Kim (Ajou University, Rep. of Korea)

Room B324, Time 15:30 ~ 17:00

[2A-1] Reinforcement Learning-Based Flocking Control for Aerial and Ground Vehicles
Naomi Kuze (Wakayama University, Japan); Tomoya Masaoka (Osaka University, Japan)

[2A-2] Road Surface Classification Using an Accelerometer and MiniROCKET on Ultra-Low-Power STM32
Pedro Delgado, Cesar Melo and Gabriel Carvalho (Bosch Car Multimedia, Portugal); Rui Silva (University of Minho, Portugal); Vitor Fukuda (Bosch Car Multimedia, Portugal)

[2A-3] Adaptive Parameter Configurations for LoRa-Based Satellite Communication in IoT Applications
Nova Khamsah, Daiki Nobayashi and Takeshi Ikenaga (Kyushu Institute of Technology, Japan); Kenichi Takizawa (National Institute of Information and Communications Technology, Japan)

[2A-4] Optimization of Update Period in Digital Twin Systems
Seonho Jang, Jongseo Lee, Jonghun Han and Minchae Jung (Sejong University, Rep. of Korea)

[2A-5] Towards the Adoption of Large Language Models for Interactive Digital Twin in Battery Management Systems
Judith Nkechinyere Njoku (Kumoh National Institute of Technology, Rep. of Korea); Cosmas Ifeanyi Nwakanma (West Virginia University, USA); Jae-Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, Rep. of Korea)

Session 2B: QoS and QoE

Chair: Truong Thu Huong (Hanoi University of Science and Technology, Vietnam)

Room B326, Time 15:30 ~ 17:00

[2B-1] A Cache Hit Judgment Method for Adaptive Bitrate Video and Audio Transmission in ICN/CCN
Ryuji Hiraiwa and Toshiro Nunome (Nagoya Institute of Technology, Japan)

[2B-2] Toward Optimal Viewport Adaptive Volumetric Video Streaming: Problem, Essential Tools, and Datasets
Quang Nguyen Long, Anh Tho Nguyen Thi, Minh Gia Tran, Nghia Dai Tran and Huong Thu Truong (Hanoi University of Science and Technology, Vietnam); Duc Nguyen (Tohoku Institute of Technology, Japan)

[2B-3] Programmable Data Plane Approach for Fairness Improvement Using AI-Based Classification of Congestion Control Algorithms
Yuya Kotoku, Daiki Nobayashi and Takeshi Ikenaga (Kyushu Institute of Technology, Japan)

[2B-4] Adaptive Early Packet Discarding Scheme with Multiple Queues Using a Programmable Data Plane for Improving Inter-Flow Fairness
Sosuke Makito, Daiki Nobayashi and Takeshi Ikenaga (Kyushu Institute of Technology, Japan)

[2B-5] Real-Time Urban Flood Detection Using YOLOv5-Seg
Jaegeun Jang and Young-Woo Kwon (Kyungpook National University, Rep. of Korea)

Session 2C: Wireless and Mobile Communications

Chair: Young June Choi (Ajou University, Rep. of Korea)

Room B332, Time 15:30 ~ 17:00

[2C-1] Experimental Evaluation of in-Metal-Pipe Wireless LAN Communication with Different Frequencies
Yuki Endo, Daiki Nobayashi and Takeshi Ikenaga (Kyushu Institute of Technology, Japan)

[2C-2] Massive MIMO Effect on Underwater Acoustic OFDM with Shortened CP
Shuji Nonaka, Haruya Ikeda and Yuki Oami (Tokyo University of Science, Japan); Daisuke Hisano (The University of Osaka, Japan); Kazuki Maruta (Tokyo University of Science, Japan)

[2C-3] Environmental-Aware Scheduler for Trustworthy 6G Communication
Roya Khanzadeh (Johannes Kepler University Linz, Austria); Fjolla Ademaj-Berisha (Silicon Austria Labs GmbH, Austria); Andreas Springer (Johannes Kepler University Linz, Austria); Hans-Peter Bernhard (Johannes Kepler University Linz, Austria & Silicon Austria Labs GmbH, Austria)

[2C-4] Occlusion-Resilient OAM Holographic Communication via Reconfigurable Metasurfaces and Jones Matrix Decoupling
Young Jae Moon and Yeon Ho Ho Chung (Pukyong National University, Rep. of Korea)

[2C-5] A Study of the Performance of LDPC Codes Under Various Decoding Algorithms and Schedules
Sangwon Chae, Hyojeong Choi, Gangsan Kim and Hong-Yeop Song (Yonsei University, Rep. of Korea); Jongsun Ahn (Korea Aerospace Research Institute, Rep. of Korea)

July 10, 2025 (Thursday)

Session 3A: Emerging Networks and Services

Chair: Joongoo Park (Kyungpook National University, Rep. of Korea)

Room B324, Time 13:30 ~ 15:00

[3A-1] Priority Protocol Delay in Maritime Systems
Andrej Stefanov (IBU Skopje, Macedonia, the former Yugoslav Republic of)

[3A-2] A Deeper Look at Divergent Counterexamples to Temporal-Difference Learning
Fatih Özgan and Mervenur Seyhan (University of Duisburg-Essen, Germany); Peter Jung (Universität Duisburg-Essen, Germany)

[3A-3] Health Care and Medical System for Early Detection of Lung Cancer Using Integrated Intelligent Techniques
Ahed Ahed Abugabah (Zayed University, United Arab Emirates); Atif Mehmood (Xidian University, China); Mohammad Tubishat (Zayed University, United Arab Emirates)

[3A-4] Mind-Sketch: a Single-Channel, Non-Invasive Brain-Computer Interface for Writing and Drawing
Soumyadipta Banerjee (Indian Institute of Technology Kharagpur, India); Ajay Unni (NightfalI AI, India); Neena Goveas (BITS Pilani Goa Campus, India); Sreejith Vidhyadharan (University of North Dakota, USA)

[3A-5] Scalable and Adaptive Exploration Framework for Multi-UAV System
Sanghyun Kim, Huichang Yun and Seungho Yoo (Pukyong National University, Rep. of Korea)

Session 3B: Wireless Sensor Networks

Chair: Seungho Yoo (Pukyong National University, Rep. of Korea)

Room B326, Time 13:30 ~ 15:00

[3B-1] Enhanced Traffic Granularity in 6TiSCH Networks: Slotframe Length Design and EWMA-Based Cell Scheduling
Jeongbae Park and Sang-Hwa Chung (Pusan National University, Rep. of Korea)

[3B-2] Construction of Real-Time Indoor Location Estimation and Visualization System That Displays Multiple Estimation Results Simultaneously
Mao Eitsuka, Shunki Sato and Eisuke Kudoh (Tohoku Institute of Technology, Japan)

[3B-3] Implicit Retransmission Control in Multi-Hop LoRaWAN
Kenji Akasu, Aoyama Koki and Takahiro Saraya (The University of Electro-Communications, Japan); Koichi Adachi (Keio University, Japan)

[3B-4] Lightweight Intrusion Detection System for MQTT-Enabled IoT Devices
Miracle Udurume, Vladimir V. Shakhov and Insoo Koo (University of Ulsan, Rep. of Korea)

[3B-5] Analysis of the Correlation Between Cell Broadcasting Service(CBS) and Floating Population in Wildfire Areas
Kyungsoo Pyo (Government Office, Rep. of Korea & National Disaster Management Research Institute, Rep. of Korea); Dongkyu Lee and Jae Seon Kim (National Disaster Management Research Institute, Rep. of Korea)

Session 3C: AI/ML Applications

Chair: Taehoon Kim (Hanbat National University, Korea)

Room B332, Time 13:30 ~ 15:00

[3C-1] A Critical Review of Benchmarking LLMs for Real-World Applications: Trends and Limitations
Huthaifa Issam Ashqar (Arab American University, Palestine & Columbia University, USA)

[3C-2] Leveraging Large Language Models (LLMs) for Traffic Management at Urban Intersections
Sari Masri (Arab American University, Palestine); Huthaifa Issam Ashqar (Arab American University, Palestine & Columbia University, USA); Mohammed Elhenawy Virginia Tech Transportation Institute, USA)

[3C-3] Classifying Digital Colposcopy Image Quality Using Predictive Models with Explainable AI
Vincent Peter C Magboo, Ma Sheila A Magboo, Isabel B. Baclig, Nicole Anne Balde, David Raphael Bobis and James Dc Sablay (University of the Philippines Manila, Philippines)

[3C-4] SynPalms: Palm Identification with Synthetic Data
Darian Tomašević and Blaž Špacapan (University of Ljubljana, Slovenia); Ani Perušić and Domagoj Pinčić (University of Rijeka, Croatia); Blaž Meden (University of Ljubljana, Faculty of Computer and Information Science, Slovenia); David Freire-Obregon (Universidad de Las Palmas de Gran Canaria, Spain); Žiga Emeršič and Vitomir Štruc (University of Ljubljana, Slovenia); Peter Peer (University of Ljubljana, Faculty of Computer and Information Science, Slovenia); Diego Sušanj (Juraj Dobrila University of Pula, Croatia)

[3C-5] Grid-Based Adversarial Patch Placement Optimization for Enhanced Object Detection Attacks
HanJu Lee, Jin Seoung Kim, Gwang Nam Kim and Seok-Hwan Choi (Yonsei University, Rep. of Korea)

Session 4A: Network Management

Chair: Sangheon Pack (Korea University, Rep. of Korea)

Room B324, Time 15:30 ~ 17:00

[4A-1] A Solution to Improve Customer Experience in IP Multimedia Subsystem
Lam Nguyen The, Huong Thi Tran, Lan Thi Huong Duong, Thinh Duc Tran and Vuong Ngo (Viettel High-Technologies Industries Corporation, Vietnam)

[4A-2] Reducing Content Retrieval Latency in ICN
Fariborz Derakhshan (Hamburg University of Technology, Germany & Nokia Bell Labs, Germany); Andreas Timm-Giel (Hamburg University of Technology, Germany); Ramon Aguero (University of Cantabria, Spain)

[4A-3] UAV-RIS Optimization for Energy Efficiency in Non-Terrestrial Systems
Seungseok Sin (Chonnam National University, Rep. of Korea); Kyunam Kim (Alps Electric Korea Company Limited, Rep. of Korea); Sangmi Moon (Korea Nazarene University, Rep. of Korea); Huaping Liu (Oregon State University, USA); Chang-Gun Lee (Seoul National University, Rep. of Korea); Intae Hwang (Chonnam National University, Rep. of Korea)

[4A-4] Information-Centric Networking-Based Active Data Retrieval Method in Spatio-Temporal Data-Retention System
Suda Tomoki, Daiki Nobayashi, Takeshi Ikenaga and Kazuya Tsukamoto (Kyushu Institute of Technology, Japan); Makoto Misumi and Ryo Nakamura (Fukuoka University, Japan)

[4A-5] Green Intelligence: Traffic Forecasting Using O-RAN AI/ML Framework
Geon Kim, Sung-Jin Lee, Hyuk Sun Kwon, Hoseong Choi and Hyun-Min Yoo (Kyunghee University, Rep. of Korea); Kyung Sook Kim and Jeehyeon Na (ETRI, Rep. of Korea); Een-Kee Hong (Kyunghee University, Rep. of Korea)

Session 4B: Emerging Communications

Chair: Seongho Chae (Tech University of Korea, Rep. of Korea)

Room B326, Time 15:30 ~ 17:00

[4B-1] On-Board Instant Wind Pressure Collection System for Optimal Vehicular Dynamics Through Communication
Cihun-Siyong Gong (National Central University, Taiwan); Yi-ChungHuang (National Central University, Taiwan); Yu-Hua Chen (National Central University, Taiwan)

[4B-2] Secure and Adaptive Trust Management Framework for V2X Communication Using Blockchain and Bayesian Optimization
Weaam Al-humadi (University of Salford, United Kingdom (Great Britain))

[4B-3] TransInDecNet: Efficient CSI Compression and Reconstruction for FDD MIMO Using Transformer
Sung UK Huh and Young-Chai Ko (Korea University, Rep. of Korea)

[4B-4] User Scheduling for Sum-Rate Maximization in IRS-Assisted Uplink Non-Orthogonal Multiple Access with IoT Applications
Min Chul Kang, Junsu Kim and Su Min Kim (Tech University of Korea, Rep. of Korea)

[4B-5] A Vision-Language-Driven UxV System for Safety Monitoring
Syed Murtaza Hussain Abidi (Kumoh National Institute Technology, Rep. of Korea); Syed Muhammad Raza (Research Assistant at Kumoh National Institute of Technology, Rep. of Korea); Jinsu Park and Soo Young Shin (Kumoh National Institute of Technology, Rep. of Korea)

Session 4C: Wireless Communications

Chair: Jingon Joung (Chung-Ang University, Rep. of Korea)

Room B332, Time 15:30 ~ 17:00

[4C-1] Beam Tracking with Deep Learning Models for Mobile Beamforming Systems
Xiaodong Wang, Xinrong Li and Yan Huang (University of North Texas, USA)

[4C-2] Battery-Aware Time Division Wireless Power Transfer Based on Channel State
Yuna Sawada, Shino Shiraki and Takahiro Matsuda (Tokyo Metropolitan University, Japan); Takefumi Hiraguri (Nippon Institute of Technology, Japan); Kazuki Maruta (Tokyo University of Science, Japan); Tomotaka Kimura (Doshisha University, Japan)

[4C-3] Deep Unfolding of Richardson Iteration for Multi-User Massive MIMO Null-Space Expansion
Yuki Sasaki (Tokyo University of Science, Japan); Salah Berra (National Institute of Informatics, Japan); Sourav Chakraborty (Cooch Behar Government Engineering College, India); Jin Nakazato (The University of Tokyo, Japan); Rui Dinis (Universidade Nova de Lisboa & Nova IT, FCT-UNL, Portugal); Kazuki Maruta (Tokyo University of Science, Japan)

[4C-4] Method and Application of Blind Preamble Estimation for Secondary Communications
Stephan Frisbie (University of Maryland, Baltimore County, USA); Mohamed Younis (University of Maryland Baltimore County, USA)

[4C-5] Dynamic Resource Allocation for Dual-Side STAR-RIS in Multi-Cell NOMA Networks
Xuexiang Piao, Danish Mehmood Mughal, Sang-Hyo Kim and Min Young Chung (Sungkyunkwan University, Rep. of Korea)

July 11, 2025 (Friday)

Session 5A: Multimedia Networking

Chair: Dongkyun Kim (Kyungpook National University, Rep. of Korea)

Room B324, Time 09:30 ~ 11:00

[5A-1] High-Speed Video Transmission System Using Multipath Backhaul and Wireless LAN
Norimasa Yafune (ATR & Sharp Corporation, Japan); Kazuto Yano and Keiichiro Mori (ATR, Japan); Toshikazu Sakano (Advanced Telecommunications Research Institute International, Japan)

[5A-2] Improving Immersive 360-Degree Video Streaming Quality with Multipath Networking
Duc Nguyen (Tohoku Institute of Technology, Japan); Huyen Tran (Tohoku University, Japan)

[5A-3] Toward Efficient Caching in Multi-Access Edge Computing for Tile-Based 360° Video Streaming
Cheolwoo You (Myongji University, Rep. of Korea); MinJi Choi (MyongJi University, Rep. of Korea); Somin Park and Hee Ju Kwak (Myongji University, Rep. of Korea)

[5A-4] Exploring the Network Performance Management of Kubernetes in Edge Devices
Hyunjin Kim, Jiyeong Kang and Kyungwoon Lee (Kyungpook National University, Rep. of Korea)

[5A-5] BridgeSync: a Digital Twin Framework for Secure and Intelligent Smart Bridge Monitoring
Judith Nkechinyere Njoku (Kumoh National Institute of Technology, Rep. of Korea); Jonathan Mukisa Kalibbala (Kumoh National Institute of Technology, Gumi, Rep. of Korea); Paul Angelo Oroceo (Kumoh National Instiutte of Technology, Rep. of Korea); George Chidera Akor, Jae Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, Rep. of Korea)

Session 5B: Autonomous Systems

Chair: Dong Seog Han (Kyungpook National Univesity, Rep. of Korea)

Room B326, Time 09:30 ~ 11:00

[5B-1] Adaptive Wireless Interface Selection Based on Wireless Characteristics for Indoor Monitoring with Autonomous Mobile Robots
Masaki Haruta, Daiki Nobayashi, Takeshi Ikenaga and Kazuya Tsukamoto (Kyushu Institute of Technology, Japan)

[5B-2] LoRaWAN Node-to-Node Implementation for Airtime Optimization and Fallback Communication
Johannes Haselberger, Rainer Poeschl and Stefan Kunze (Deggendorf Institute of Technology, Germany)

[5B-3] Towards a Decentralized IoT Onboarding for Smart Homes Using Consortium Blockchain
Narges Dadkhah and Khan Reaz (Freie Universität Berlin, Germany); Gerhard Wunder (Freie Universität Berlin & AG Cybersecurity and AI, Germany)

[5B-4] MERC-KDC: Multimodal Emotion Recognition in Conversation via Knowledge Distillation and Contrastive Learning
DeogHwa Kim (INHA UNIV, Rep. of Korea); Jikyu Park (Inha Univ, Rep. of Korea); Deok-Hwan Kim (Inha University, Rep. of Korea)

Session 5C: AI/ML for Networks

Chair: Sangheon Pack (Korea University, Rep. of Korea)

Room B332, Time 09:30 ~ 11:00

[5C-1] Reinforcement Learning for Scalable and Efficient Task Scheduling in Loosely Coordinated UAV Swarms
Elarbi Badidi (UAE University, United Arab Emirates); Omar El Harrouss (UAEU, United Arab Emirates)

[5C-2] AMM-RF: Adaptive Multi-Modal Meta-Ensemble Learning for Robust RF-Based Drone Detection in Noisy Environments
Zeeshan Kaleem (King Fahd University of Petroleum and Minerals (KFUPM), Pakistan)

[5C-3] Comparative Analysis of Network Coding Algorithms in Centralized Federated Learning over Unreliable Networks
Jungmin Kwon and Hyunggon Park (Ewha Womans University, Rep. of Korea)

[5C-4] Multi-Agent Deep Q-Network-Based Handover Optimization for Multi-Beam LEO Satellite Networks
Chungnyeong Lee (Tech University of Korea, Rep. of Korea); Taehoon Kim and Inkyu Bang (Hanbat National University, Rep. of Korea); Seong Ho Chae (Tech University of Korea, Rep. of Korea)

[5C-5] Intelligent Cluster Head Selection for WSNs Using Modified Particle Swarm Optimization
Haris Muhammad and Haewoon Nam (Hanyang University, Rep. of Korea)

July 9, 2025 (Wednesday)

Poster Session 1
Room B306, Time 13:30 ~ 15:00

[P1-1] Distributed Auction-Based Pilot Assignment for Scalable Cell-Free Massive MIMO Systems
Saeyoung Cho (ETRI, Rep. of Korea)

[P1-2] Joint Beam and Power Control in Multi-Beam LEO Satellite Systems via a Modular Deep Q-Network
Yejin Shin, Chungnyeong Lee, Sangcheol Lee and Seong Ho Chae (Tech University of Korea, Rep. of Korea)

[P1-3] Effects of User Ratings in GSP-Based Recommendation Systems
Namgi Kim, Hee-chan Kim and Kyungyong Chung (Kyonggi University, Rep. of Korea); Janggun Jeon (University of Kyonggi Graduate School, Rep. of Korea)

[P1-4] Enhancing Performance of Multimodal-Based Anomaly Detection Using Early Fusion
Jang Yunjin, Namgi Kim and Kyungyong Chung (Kyonggi University, Rep. of Korea)

[P1-5] A Smoothing Filter Based Active Suspension System with Temporary Model Uncertainty
Pyung Soo Kim (Tech University of Korea, Rep. of Korea)

[P1-6] A Spatially Conditioned Latent-Based cGAN
Seulin Lee, Jongjae Lee, Gibum Joung, Dongje Yang and Su Sik Bang (Tech University of Korea, Rep. of Korea)

[P1-7] PureLLM: a Blockchain-Driven Decentralized PFL for Robust and Resource-Efficient Next-Gen LLMs
Md Tayeb Adnan, Paul Angelo Oroceo, Jae Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, Rep. of Korea)

[P1-8] Indoor Positioning Using Wi-Fi RSSI Based on LSTM-XGBoots Combined Model
Jinlong Li, Hwang Jun Gyu and JoonGoo Park (Kyungpook National University, Rep. of Korea)

[P1-9] Robust Fabric Recognition via Attention-Driven Lightweight Networks and Strategic Data Processing
MingShou An (Xi'an Technological University, China); Shuang Cao (China); Hye-Youn Lim (Dong-A Univ, Rep. of Korea); Dae-Seong Kang (University of Dong-A, Rep. of Korea)

[P1-10] Sparse Point Cloud Reconstruion by Directed Compressed Sensing Network
Taehyeon Choi (Chung-Ang University, Rep. of Korea & Graduate School of Advanced Imaging Sciences, Multimedia and Film, Rep. of Korea); Jin Wan Park (Chung-Ang University, Rep. of Korea)

[P1-11] Automatic Image Curation and Few-Shot Classification Method for Fashion Images
Min-Soo Ko and Hyok Song (Korea Electronics Technology Institute, Rep. of Korea)

[P1-12] Network-Based Distributed Edge/Controller Control Architecture for Providing Real-Time, Hyper-Realistic, Large-Capacity Application Services
Byeongok Kwak (ETRI, Rep. of Korea)

[P1-13] Denoising 3D Maps with LSTM Neural Networks
Hoon-Seok Jang (Korea Electronics Technology Institute, Rep. of Korea); Gyuwon Lee (Korea Electronics Technology Institute, Rep. of Korea); Choi Ju-Hwan (Korea Electronics Technology Institute, Rep. of Korea)

[P1-14] Estimation of Tomato Leaf Area Using Image Analysis and Machine Learning Models
Gyuwon Lee (Korea Electronics Technology Institute, Rep. of Korea); Hoon-Seok Jang, Keunho Park and Choi Ju-Hwan (Korea Electronics Technology Institute, Rep. of Korea)

[P1-15] A Linear Transformation-Based Method for PBCH Combining in 5G NR
Youngil Jeon (Electronics and Telecommunications Research Institute, Rep. of Korea); Hyungsik Ju (ETRI, Rep. of Korea); Jeeyon Choi (Electronics and Telecommunications Research Institute, Rep. of Korea); JunHwan Lee (ETRI, Rep. of Korea)

Poster Session 2
Room B306, Time 15:30 ~ 17:00

[P2-1] Implementation of Real-Time Radar System for Moving Human Indication Using CW Radar
Young-Seok Jin, JiEun Bae and Eugin Hyun (DGIST, Rep. of Korea)

[P2-2] Diffusion-Based Imputation Method for Structured Missingness in Operational ESS Sites
Jinwon Park, Changwoo Kim and Hyo-Sub Choi (Korea Electronics Technology Institute, Rep. of Korea)

[P2-3] Building Optimized Wireless Pedestrian Counting Sensors Combining Passive and Active Technologies
Tiago Vieira (Iscte - University Institute of Lisbon, Portugal); Rui Neto Marinheiro (Instituto de Telecomunicações, ISCTE - Instituto Universitário de Lisboa, Portugal); Fernando Brito e Abreu (ISTAR-IUL, Instituto Universitário de Lisboa (ISCTE-IUL), Portugal)

[P2-4] An Improved Dynamic Hash Table on GPU with Configurable on-Chip Memory
Yeim-Kuan Chang and Chu-Chia Chuang (National Cheng Kung University, Taiwan)

[P2-5] Synergistic Smart Grid: Instability and Fault Detection Using Blockchain and Federated Learning
Jonathan Mukisa Kalibbala (Kumoh National Institute of Technology, Gumi, Rep. of Korea); Love Allen Chijioke Ahakonye, Jae Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, Rep. of Korea)

[P2-6] Energy-Efficient Blockchain-Based Carbon Trading and Credit Framework for Korean ETS
Ihunanya U Ajakwe, Victor Ikenna Kanu, Simeon Okechukwu Ajakwe and Dong Seong Kim (Kumoh National Institute of Technology, Rep. of Korea)

[P2-7] TSFormer: Temporal-Aware Transformer for Multi-Horizon Forecasting with Learnable Positional Encodings and Attention Mechanisms
Franck Junior Aboya Messou, Jinhua Chen, Tong Liu, Shilong Zhang and Keping Yu (Hosei University, Japan)

[P2-8] Computational Complexity Analysis of AOA Estimation Algorithms with CRA Antenna
Tae-Yun Kim and Suk-seung Hwang (Chosun University, Rep. of Korea)

[P2-9] Adoption of Enhanced Inverted Index for Fingerprint Based Indoor Positioning
Jaejun Yoo (Electronics and Telecommunication Research Institute, Rep. of Korea); DongWan Ryoo and Moon Soo Lee (ETRI, Rep. of Korea)

[P2-10] Case Studies of AI and LiDAR Integration for Pothole Detection and Road Condition Monitoring in Seoul, South Korea
Sung Pil Shin (Korea Institute of Civil Engineering and Building Technology, Rep. of Korea); Sang Yum Lee (Induk University, Rep. of Korea); Tri HM Le (Nguyen Tat Thanh University, Vietnam & Korea Institute of Civil Engineering and Building Technology, Rep. of Korea)

[P2-11] Autonomous UAV-Based Fire Suppression Platform Using SLAM in Industrial Environments
Sung Hyun Oh, Chang Gyu Lee and Jeong Gon Kim (Tech University of Korea, Rep. of Korea)

[P2-12] Adaptive Consensus Kernel Clustering for Manifold-Structured Data
Seongrok Kim, Sanghyuk R Choi, Sun Jae Baek, Chanhoe Gu, Donghwan Hwang and Minhyeok Lee (Chung-Ang University, Rep. of Korea)

[P2-13] Enhanced Lightweight Deep Learning-Based Object Classification for Edge Devices
Dongchil Kim (Korea Electronics Techonlogy Institute (KETI), Rep. of Korea); Kyeongeun Seo and Chang Mo Yang (Korea Electronics Technology Institute, Rep. of Korea)

[P2-14] Detection of Child Abuse Using LLM and XGBoost
JungHyun Lee (Kwangwoon University, Rep. of Korea); Chae ran Kim (Korea Institute of Energy Technology, Rep. of Korea & KENTECH, Rep. of Korea); Chong-Kwon Kim (Korea Institute of Energy Technology, Rep. of Korea)

[P2-15] Anomaly Detection for Pumps in Water Treatment Plants via Frequency-Domain Vibration Analysis
Jongwoo Choi (Electronics and Telecommunications Research Institute, Rep. of Korea); Si-Hyun Park (K-Water Research Institute, Rep. of Korea); Sang-Byeong An (Korea Water Resources Corporation, Rep. of Korea); Jinsoo Han and Wan-Ki Park (ETRI, Rep. of Korea)

[P2-16] How Trustworthy is the Critic? an Empirical Assessment of PPO's Initial Value Estimates
SooYoung Jang, Changbeom Choi and Eunkyung Kim (Hanbat National University, Rep. of Korea)

[P2-17] WalkSum: Graph Summarization for Accurate Random Walks
Kishin Okamatsu, Tsuyoshi Yamashita and Kunitake Kaneko (Keio University, Japan)

July 10, 2025 (Thursday)

Poster Session 3
Room B306, Time 13:30 ~ 15:00

[P3-1] Biometric Authentication in Identity and Access Management
Hassan Mistareehi (Murray State University, USA & Ammar's Auto Services LLC, USA); Jason Owen (Murray State University, USA)

[P3-2] Resource-Efficient Reversible Quantum Circuit for Theta Function in SHA-3
Yeonsong Suh and Younghoon Park (Sookmyung Women's University, Rep. of Korea)

[P3-3] An Area-Efficient ChaCha20 Hardware Accelerator Design for Secure and Real-Time Communication in CAVs
Myeongjin Kwak (Kyungpook National University, Rep. of Korea); Tae Hee Lee, Do Hoon Lee and Tae-Hyoung Kim (Korea Intelligent Automotive Parts Promotion Institute, Rep. of Korea); Yongtae Kim (Kyungpook National University, Rep. of Korea)

[P3-4] GPU-Based Offloading of Curve25519 in Hyperledger Indy for IoT Environments
Jihyeon Oh and Kyungwoon Lee (Kyungpook National University, Rep. of Korea)

[P3-5] Blockchain-Enabled Framework for Efficient and Interoperable Proteomic Data Management
Victor Ikenna Kanu (Kumoh National Institute of Technology, Rep. of Korea); Josiah Isong (Nigerian Institute of Medical Research, Nigeria); Simeon Okechukwu Ajakwe, Taesoo Jun and Dong Seong Kim (Kumoh National Institute of Technology, Rep. of Korea)

[P3-6] Optimization-Based Sensor Position Error Correction for Underwater Applications
Yunui Hong, Sangman Han, Hojun Lee and Kye-Won Kim (Hoseo University, Rep. of Korea)

[P3-7] Kriging Based Cartography - Dataset with Empirical Measurements of SQI
Min Joon Kim (Soogsil University, Rep. of Korea); Won Cheol Lee (Soongsil University, Rep. of Korea)

[P3-8] Enhancement of C-DRX Efficiency with Traffic Prediction Using Ensemble Learning Models
Ji-Hee Yu, Yoon Ju Choi, Hyeyoon Jeong, Jaeun Kim and Hyoung Kyu Song (Sejong University, Rep. of Korea)

[P3-9] 1XK Differential Space-Time Line Code with Phase-Shift Keying Modulation and Code Hopping for Secure Communications
Jingon Joung (Chung-Ang University, Rep. of Korea)

[P3-10] GNN-Based 5G Localization with Beam Information via Graph Expansion
Hasom Seo and Hongseok Jung (Hanyang University, Rep. of Korea); Youngsu Cho (Electronics and Telecommunications Research Institute (ETRI), Rep. of Korea); Sunwoo Kim (Hanyang University, Rep. of Korea)

[P3-11] Deep Learning-Based Precoding for Partially-Connected Hybrid Beamforming Systems
Juhyoung Sung (Korea Electronics Technology Institute (KETI), Rep. of Korea); Won-Gi Jeon and Sungyoon Cho (Korea Electronics Technology Institute, Rep. of Korea); Ki Won Kwon (Koera Electronics Technology Institute, Rep. of Korea); Kyung-Won Park (Korea Electronics Technology Institute, Rep. of Korea)

[P3-12] Iterative DOA Estimation and MVDR Beamforming for Enhanced SNR in Narrowband Signals
Hyeongrae Kim, Joomyung Jung and Oh Hyuk Jun (Kwangwoon University, Rep. of Korea)

[P3-13] Adaptive Beamforming Technique for Long- Distance, High-Speed Communications of Antarctic Unmanned Exploration Robots
Woo Yong Lee (Electronics and Telecommunications Research Institute, Rep. of Korea); Keunyoung Kim (ETRI, Rep. of Korea)

[P3-14] Coordinated Switching of Forward/Backward Link Signals for Distributed TRP/Reader Based Ambient IoT Systems
Chanho Yoon, Byung-Jae Kwak and Yongsun Kim (ETRI, Rep. of Korea); Young-Jo Ko (Electronics and Telecommunications Research Institute, Rep. of Korea)

[P3-15] Performance Evaluation of Two-Step Random Access with Message Bundling for LEO Satellite Networks
Taehoon Kim (Hanbat National University, Rep. of Korea); Seong Ho Chae (Tech University of Korea, Rep. of Korea); Inkyu Bang (Hanbat National University, Rep. of Korea)

[P3-16] Study on SCMS-Based Certificate and Electronic Signature Validity Verification in C-ITS Environment
Youngjin Kim (Teleconmmunications Technology Association, Rep. of Korea)

[P3-17] A Mobile System Architecture for Store-and-Forward Operation in Non-Terrestrial Networks
HyunKyung Yoo (Electronics and Telecommunications Research Institute, Rep. of Korea); Namseok Ko and Mi-ryong Park (ETRI, Rep. of Korea)

Poster Session 4
Room B306, Time 15:30 ~ 17:00

[P4-1] Comparative Analysis of CNN Models for SNR Estimation
Abdullah Al Mahbub (Chosun University, Rep. of Korea); Ijaz Ahmad (Korea University, Rep. of Korea); Seokjoo Shin (Chosun University, Rep. of Korea)

[P4-2] Deep Learning-Based Wideband Signal Detection via Time-Frequency Analysis for LPD Communication
Soyeon Jeon, Jae Hyeon Lee and Eui-Rim Jeong (Hanbat National University, Rep. of Korea)

[P4-3] Dynamic 5G Network Slice Management Using Unsupervised Modeling and Explainable AI
Harun Ur Rashid and Seong Ho Jeong (Hankuk University of Foreign Studies, Rep. of Korea)

[P4-4] CNN-Based Spectrum Sensing with Asymmetric Weighting in LPD Communication System
Jae Hyeon Lee, Soyeon Jeon and Eui-Rim Jeong (Hanbat National University, Rep. of Korea)

[P4-5] Optimal Inference Task Length for Minimizing Synchronization Error in Digital Twin Systems
Subin Choi, Hongjae Jeong, Jonghun Han and Minchae Jung (Sejong University, Rep. of Korea)

[P4-6] CDMA-Based Broadband UAC Modem: a Modulation and Demodulation Design Approach
Taegeon Chung and Kang-Hoon Choi (LIG Nex1, Rep. of Korea); Tae-Ho Im (Hoseo University, Rep. of Korea)

[P4-7] Feasibility Analysis of Frequency Sharing Between UAV and AeroMACS Systems
Ho Kyung Son (ETRI, Rep. of Korea)

[P4-8] Non-Orthogonal Multiple Access with Index Modulated Non-Orthogonal Frequency Division Multiplexing
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[P4-9] Deep Learning-Based Power Allocation for Cell-Free Massive MIMO Networks with Adaptive Access Point Power Control
Yoon Ju Choi, Ji-Hee Yu, Hyeyoon Jeong, Jaeun Kim and Hyoung Kyu Song (Sejong University, Rep. of Korea)

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Heeju Choi, Chungnyeong Lee and Seong Ho Chae (Tech University of Korea, Rep. of Korea)

[P4-11] Security Analysis and Mitigation of "PRLAP-IoD: a PUF-Based Robust and Lightweight Authentication Protocol for Internet of Drones"
Deok Kyu Kwon and YoungHo Park (Kyungpook National University, Rep. of Korea)

[P4-12] Security Analysis and Solution Proposal for Authentication Systems Using PUF in IoD Environment
JoonYoung Lee (Electronics and Telecommunications Research Institute (ETRI), Rep. of Korea); Ho-Min Park (Electronics and Telecommunications Research Institute, Rep. of Korea)

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[P4-14] A Microwave Amplifier with Two Output Ports
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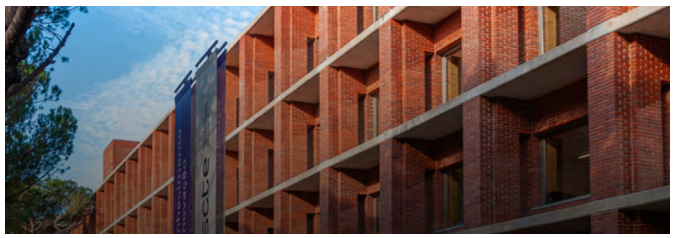

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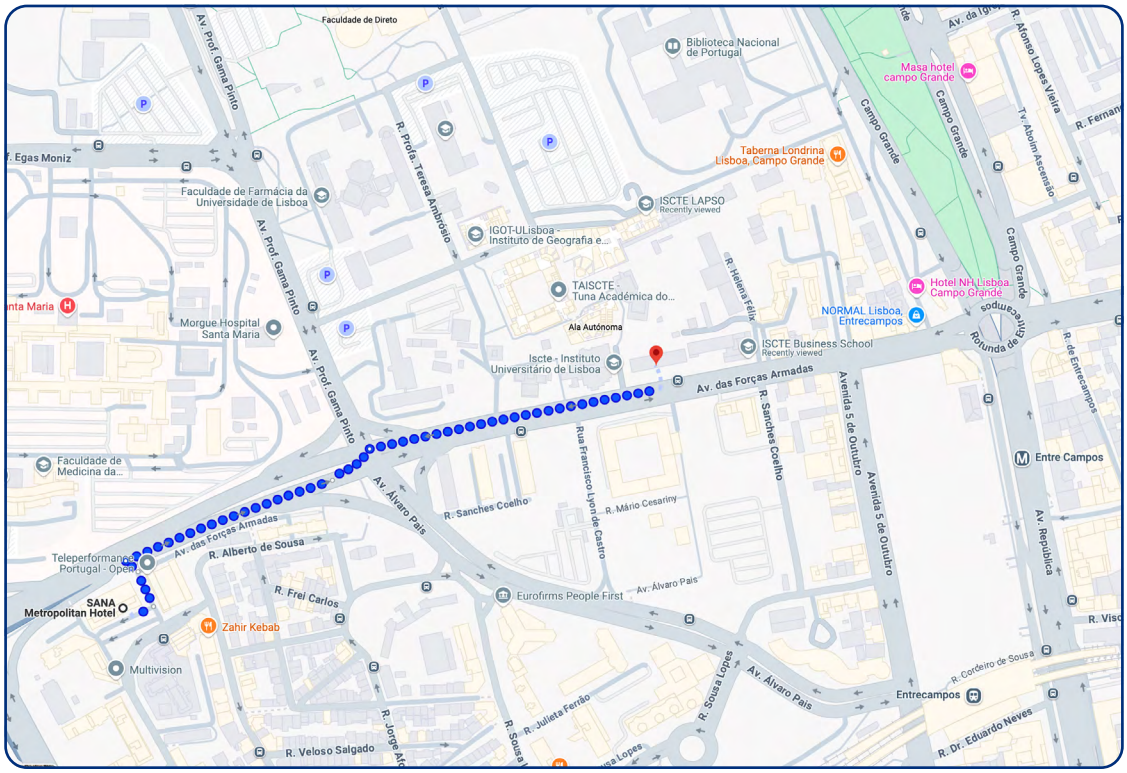
Introduction

The Iscte - University Institute of Lisbon was founded in 1972 as one of Portugal's first modern universities, with the central aim of studying labour and social dynamics in a rapidly changing world. Since its establishment, the university has expanded its disciplinary reach into five schools: Iscte Business School, the School of Sociology and Public Policy, the School of Technology and Architecture, the School of Social Sciences and Humanities and the School of Applied Digital Technologies (Iscte - Sintra).

On campus, students find not only a robust intellectual tradition, with mentorship from teaching staff involved in cutting-edge research, but also a vibrant, multicultural environment. Of the approximately 10 000 students enrolled in undergraduate and postgraduate programs, nearly 20% are international, coming from 80 different countries.

Map



True 4Hour Private Tuk Tuk Tour: Discover Lisbon with a Local!t

Get ready to fall in love with Lisbon and maximize your vacation time on this half-day private tour by electric tuk-tuk. Cover ground quickly in an eco-friendly tuk-tuk as you explore the historic center of Lisbon and the historic Belem district. Customize the itinerary according to your preferences or check out top landmarks including the Alfama neighborhood, the Jerónimos Monastery, the lookout point at Miradouro da Senhora do Monte, and more.

Sintra and Cascais Small-Group Day Trip from Lisbon

See Portugal's natural and architectural wonders on a small-group, guided tour of Sintra and Cascais from Lisbon. On this journey, experience the rich vegetation of Sintra Natural Park, the hidden trails and caves at Pena Park and the bluffs of Roca Cape. Tour the immaculate Pena National Palace and then drive along the Atlantic Coast to Cascais for a leisurely walk through town to its scenic beaches.

Royal Treasure Museum. Crown Jewels

The permanent collection of the Museu do Tesouro Real/ Joias da Coroa (Royal Treasure Museum/Crown Jewels) displays a great number of the former assets of the Portuguese Royal Family, including artworks that belonged to the Crown, as well as several items that belonged to private collections of various members of the Portuguese Royal Family.

The Museum has eleven exhibition areas.

The visit starts with Ouro e os diamantes do Brasil (Gold and diamonds from Brazil), where raw pieces of rare metals and gems are displayed, followed by a set of Crown coins and medals.

The Jewels on display are from many different sources that belonged either to the Crown or to private collections of different members of the Portuguese Royal Family.

The space dedicated to the Ordens Honoríficas, 4º núcleo (Orders, Decorations and Medals of Portugal, 4th exhibition area), has an unparalleled national collection, a centuries-old testament to the constantly busy international relations of the Portuguese Court.

Oceanário de Lisboa

Considered the best aquarium in the world by Tripadvisor, in 2015, 2017 and 2018, Oceanário de Lisboa creates emotions through the ocean and its 8,000 marine creatures. An experience that everyone wants to live. Considered the best aquarium in the world by Tripadvisor, in 2015, 2017 and 2018, Oceanário de Lisboa (Lisbon Oceanarium) creates emotions through the ocean and its 8,000 marine creatures.
Among these, rays, coral reefs, sharks and sea otters.
An experience that everyone wants to live.
Touring through the permanent exhibition is an exalting experience for the senses. A big central aquarium, with five million litres of saltwater, symbolizes the Global Ocean. Surrounding this big aquarium, four marine habitats create the illusion that there is only one aquarium.
The visit it's between two levels, at surface and underwater.
The temporary exhibition, "Forests Underwater by Takashi Amano", presents tropical forests and their aquatic systems through the largest nature aquarium in the world, created by the famous aquascaper, Takashi Amano.
An experience of pure engagement with these environments, where art, beauty and nature are perfectly connected.

National Palace of Mafra

The National Palace of Mafra was proclaimed a UNESCO World Heritage Site in 2019.
The Royal Palace occupies the noble floor of the Mafra building and the 2 turrets.
The north turret was occupied by the king and the south turret by the queen, and both turrets are linked by a 232-metre gallery – making it Europe's largest palatial corridor. This building, of about 40,000 m2, housed a Franciscan convent (300 fryers) – and features Campo Santo, the Infirmary, the Elliptical Hall (capitular), the Literary Acts Hall, the Stairway and the Dining Hall.
It boasts a large library thought to be one of the most beautiful in the world. The Royal Building has two carillons with 98 bells – the largest of its time. The Basilica's 6 organs are pieces of unique heritage worldwide.

The Royal Convent and Palace of Mafra is the most important baroque monument in Portugal. The building covers an area of almost four hectares (37.790 m2), including 1.200 rooms, more than 4.700 doors and windows, 156 stairways and 29 inner yards and courtyards.
Such magnificence was only possible due to the Brazilian gold that poured into the country, allowing the King to carry out his patronage of the arts and the strengthening of royal authority.

Castelo de São Jorge

Given its outstanding location, a highlight of the Castelo de São Jorge is its many viewpoints affording majestic and unparalleled views of Lisbon.
Built in the mid-11th century, this fortification still retains eleven towers displaying various architectural features characteristic of military fortifications from the Moorish period.
The steps leading up the sides of the curtain walls provide access to the ramparts and towers enabling visitors to explore the entire perimeter.

Pilar 7 Bridge Experience

An interactive and immersive experience that allows an unique discovery of the Ponte 25 de Abril.
A new cultural attraction in Lisbon!
Located in Alcântara (Avenida da Índia), this interactive centre allows all visitors to have an unique experience of the bridge – considered one of the prettiest in the world – via a tour that takes in the exterior areas of this key pillar and the sensory experience of visiting its interior.
It is a trip through the history of its construction and ends with an elevator ride up to a panoramic viewing point that provides an unrivalled view of the city and the river. Making use of modern multimedia devices, your visit ends with an immersive virtual reality experience of parts of the bridge that are inaccessible and a call at the PhotoBooth so you can record this unforgettable moment.

Jardim Zoológico de Lisboa

Come and discover where the four-legged and finned inhabitants of Lisbon live. The zoo's aim to conserve habitats has been very successful in helping to reproduce species.
Lisbon Zoo, opened in 1884, is one of the most pleasant and interesting places to visit in Lisbon.
Besides the efforts made to create increasingly natural habitats for the various species, their conservation and study programmes have produced good results.
The offspring which are born here are always cause for national celebration. The park, which also promotes the conservation of countless plant species, is therefore a place where families go to have fun, learn something new and feel the absolute calmness of one of the busiest parts of the city.
Discover the Zoo, which has reinvented and repositioned itself and evolved from an exotic animal showcase to one of the most active forces in animal and habitat conservation.

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