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KICS Winter Conference 2024

Program

Date January 31(Wed) ~ February 2(Fri), 2024

Venue Yong Pyong Resort, Pyeongchang, Korea

Organized by KICS The Korean Institute of Communications and Information Sciences

Patrons GWTO 강원관광재단 Gangwon Tourism Organization · LG U+ · LIG Nex1 · SK telecom · SAMSUNG · 한화시스템 · LG Electronics · GREENTECH INC. · GL associates · RIGOL · VSI · NUBICOM · ERICSSON · LG

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KICS
The Korean Institute of
Communications and
Information Sciences

Table of Contents

Message from the Chairs

Dear Members of the Korean Institute of Communications and Information Sciences,

As we welcome the Year of the Blue Dragon in 2024, the Korean Institute of Communications and Information Sciences (KICS) is pleased to announce the KICS Winter Conference 2024, which will be held at Yongpyong Resort. This year is a meaningful year as it marks the 50th anniversary of the founding of KICS. KICS has prepared an academic program on a variety of topics to ensure that this event is beneficial to its members and serves as an opportunity for extensive research exchange.

Specifically, we organized special sessions on a variety of topics related to the latest Information and Communications Technology (ICT), starting with several interesting invited talks that include ETRI Vice President Baek Yong-Soon's 'Optical connection technology for next-generation communications', Samsung Electronics Vice President Choi Sung-Hyun's '6G standardization and technology development outlook', SK Telcom Vice President Lee Jong-Min's 'Major technologies and services in the AI era', Hanwha Systems Director Park Sung-Gyun's 'Status of Tactical Convergence Network Technology for All-Domain Operations (ADO)', and LIG Nex1 Director Kim Do-Kyung's 'Development Direction of Integrated Communication System for Establishing a Korean-style Joint All-Domain Command and Control System.' We also hosted distinguished speakers such as Prof. Kaibin Huang from the University of Hong Kong and Prof. Kai Kit Wong from UCL in the U.K. as part of the Global Scholars Program, offering high-level lectures on the latest ICT research. Additionally, tutorials on diverse subjects will be presented by experts including Dr. Min-Keun Chung from Ericsson, Prof. Ahmed Alhkateeb from Arizona State University, Prof. Ji-Yong Son from Yonsei University, and Prof. Jihong Park from Deakin University. We prepared various special sessions, including a session for new researchers joining KICS, a 6G forum, a Samsung Research special session, an NI Hands-on session, and a Startup special session.

Like last year, we will award outstanding papers selected through evaluation as part of the KICS Winter Conference 2024. To encourage student participation in the field of ICT, we also prepared a session where undergraduate students can present their results.

The KICS Winter Conference 2024 will be conducted basically offline, and we anticipate it to be a vibrant platform for domestic and international ICT experts to learn and engage in discussions on various topics. We sincerely request the active participation of KICS members.

Finally, we express our gratitude to the organizing committee members and the staff of the KICS office for dedicating their valuable time to prepare for this year's KICS Winter Conference. We hope this will be a fruitful academic event providing an opportunity for meaningful communication with our KICS members.

───────── **Winter Conference 2024 Committee Chairs** ─────────

Seong-Ho Jeong

President of KICS

Sungrae Cho
Organizing /
Technical Program
Committee Chair

Oh-Soon Shin
Organizing / Technical
Program Committee
Vice-Chair

Chan-Byoung Chae
Organizing / Technical
Program Committee
Vice-Chair

Ji-Woong Choi
Organizing / Technical
Program Committee
Vice-Chair

Committees

Seong-Ho Jeong (President of KICS, Hankuk University of Foreign Studies)

Technical Program Committee

Chairs

Sungrae Cho (Chung-Ang University)

Vice-Chairs

Oh-Soon Shin (Soongsil University)   Chan-Byoung Chae (Yonsei University)
Ji-Woong Choi (Daegu Gyeongbuk Institute of Science and Technology)

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Jiho Song (Hanyang University)   Ohyun Jo (Chungbuk National University)
Song Noh (Incheon National University)   Sangmi Moon (Korea Nazarene University)
Jemin Lee (Yonsei University)   Hyun Jong Yang (Pohang University of Science and Technology)
Jeonghun Park (Yonsei University)   JeongGil Ko (Yonsei University)
Hye Won Chung (Korea Advanced Institute of Science and Technoogy)   Chang-Sik Choi (Hongik University)
Minchae Jung (Sejong University)   Won-Yong Shin (Yonsei University)
Jeongho Kwak (Daegu Gyeongbuk Institute of Science and Technology) Daewon Seo (Daegu Gyeongbuk Institute of Science and Technology)
Jinseok Choi (Korea Advanced Institute of Science and Technology)   JUN, TAESOO (Kumoh National Institute of Technology)
Kabseok Ko (Kangwon National University)

Undergraduate

Daeyoung Park (Inha University)   Young-Sik Kim (Daegu Gyeongbuk Institute of Science and Technology)
Seung-Woo Ko (Inha University)   Haejoon Jung (Kyung Hee University)
Bang Inkyu (Hanbat National University)   Seong Ho Chae (Tech University of Korea)
Taehoon Kim (Hanbat National University)

Special Program Committee

Members

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Ki-Hyung Kim (Ajou University)   Dong-Seong Kim (Kumoh National Institute of Technology)
Haewoon Nam (Hanyang University)   Park Minho (Soongsil University)
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Dong Seog HAN (Kyungpook National University)   Jun Heo (Korea University)

Registration

▣ Registration Fee(KRW)

Registration		Early Birds	Regular/On-Site	Note
Member	Student	190,000	240,000	Reception coupon is not included
	Regular/Life	270,000	310,000	
Non-member	Student	220,000	270,000	Reception coupon is not included
	Regular	330,000	370,000	
Undergraduate Student		90,000	110,000	Reception coupon is not included
Tutorial Registration		Same as conference registration		

▣ Important Dates

Early Birds (Author Registration)	January 2 ~ 24, 2024
Regular/On-Site	January 25 ~ February 2, 2024

▣ Registration Policy

1. To be published in the KICS Winter Conference 2024 Proceedings (Available for download : ~ February 29), a minimum of one author from each accepted paper MUST register and be a KICS member, and the paper must be presented at the conference.
2. A valid student ID is required at the registration desk to check the eligibility for student-rate registration.
3. Registrations include access to conference sessions, a program book, souvenirs, a luncheon (February 1), Reception (January 31) and coffee breaks. (Student, Undergraduate Student : Reception coupon is not included)
4. Non-refundable author registration fees must be paid prior to the early registration due.
5. For non-author registrations, absolutely no cancellations/refunds will be accepted after the early registration due.

Registration

■ Method of Payment

Card	· Visa, Master, and JCB are available to use for online registration. · Payment by credit card is available through the online procedure. · All service charges on credit card are to be paid by registrants. · Actual debit amount is subject to change according the exchange rate.	
Bank Transfer	· All bank remittance charges are to be paid by registrants. · Sender's name should be the registrant's name.	
	Bank Name	WOORI BANK
	Account No.	192-05-027627
	Swift Code	HVBKKRSE
	Bank Address	1-203, Hoehyeon-dong, Jung-gu, Seoul, Korea
	Beneficiary	Korea Information and Communications Society(KICS)
	Beneficiary Address	#06296, 3F, 32-3, Nonhyeon-ro 38-gil, Gangnam-gu, Seoul, Republic of Korea
	Beneficiary TEL	+82-2-3453-5555

■ Refund Policy

- If you have already registered for KICS Winter Conference 2024 and find that you are unable to attend or cancel the paper, please notify KICS Winter Conference 2024 secretariat in writing to conf2@kics.or.kr to request a refund and cancel your registration.
- Refund will be made upon receipt of this written notice after the conference.
- All bank service charges are to be paid by the registrant.
- No cancellations/refunds will be accepted after the early registration due.
- If you have any questions, please contact Registration Secretariat of KICS Winter Conference 2024 at conf2@kics.or.kr.

KICS Winter Conference 2024 Proceedings ISSN Number

ISSN : 2383-8302(Online) Vol.83

Information for Presenter

▣ Session Type

Category	Session Type
English Paper	Oral Session

▣ Guideline for Presenters

Oral Session	· Please show up 10 minutes before the session starts. · Bring a USB memory with your PowerPoint presentation and make sure that your file is copied on the laptop computer in the session room. · Each session is basically assigned 80 minutes with 6-8 presentations, making 10~15 minutes per presentation. (*The presentation time can be changed according to the number of papers assigned.)

Conference Venue & Session Room Location

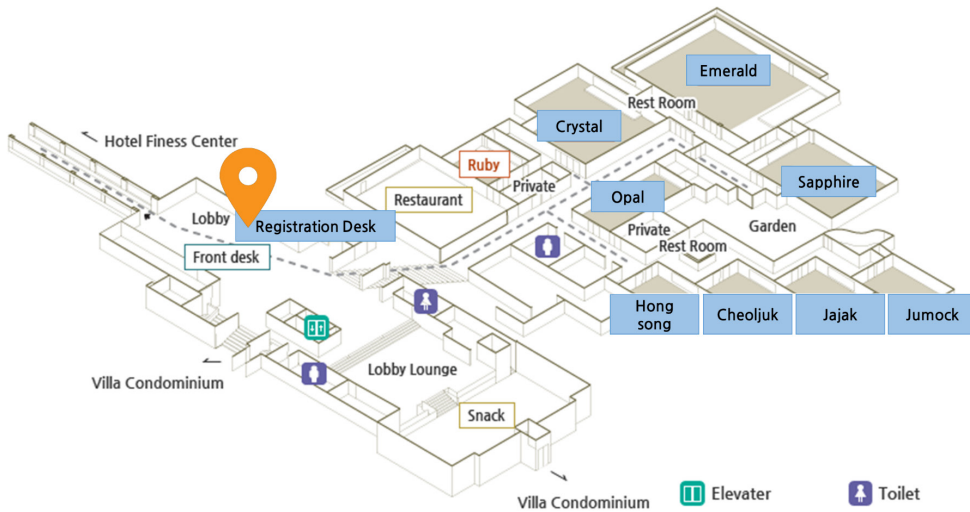## ※ Conference Venue : Mona Yongpyong Resort Tower

· Tower Condominium : Session Room/Registration Desk
· BlissHill Stay : Reception
· Dragon Plaza : Lunch

Resort map

Conference Venue & Session Room Location

Tower Condominium

Emerald

Rest Room

Crystal

Ruby

Hotel Finess Center

Private

Sapphire

Lobby

Registration Desk

Opal

Restaurant

Front desk

Private

Rest Room

Garden

Hong song

Cheoljuk

Jajak

Jumock

Villa Condominium

Lobby Lounge

Snack

Villa Condominium

Elevater   Toilet

BlissHill Stay

2F   Seminar room   Cafeteria   Elevator   Women's rest room   Men's rest room

Tower condo direction

Cafeteria Avec

Laundry   Kitchen

Front desk

leader room

Counseling / Infirmary

Maru Hall

Wellnes Hall

Ara Hall

Nuri Hall

Forest condo direction
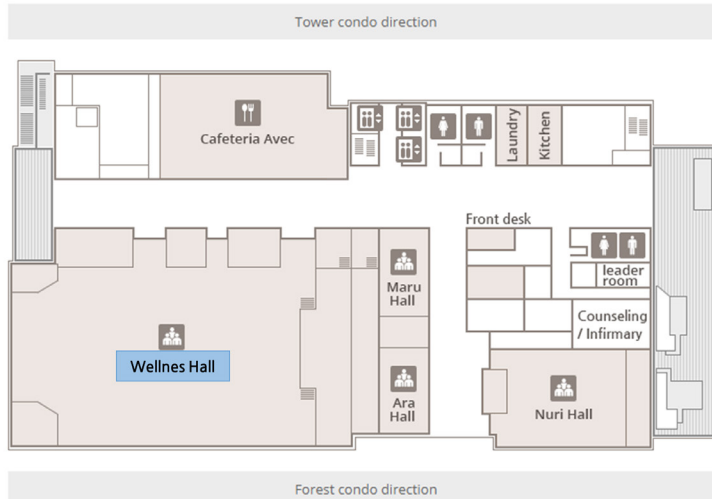
Program at a Glance

January 31 (Wed) – Tower Condominium, 1F							
Oral Session							**Poster Session**
Hongsong	Cheoljuk	Jajak	Jumock	Opal	Sapphire	Crystal	Emerald
12:00 ~ 17:00	Registration (Tower Condominium Lobby, 2F)						
13:00 ~ 14:20 (80min) — 1A / 2A / 3A / 4A / 5A / 6A / 7A / 8A–P	Special Session (1A)	Korean Paper Session (2A)	Special Session (3A)	Workshop (closed) (4A)	Workshop (closed) (5A)	Special Session (Tutorial 1) (6A)	Special Session (Young Researcher) (7A)	Korean Paper Session (8A–P)
14:30 ~ 15:50 (80min) — 1B / 2B / 3B / 5B / 6B / 8B–P	Special Session (1B)	Special Session (2B)	Special Session (3B)	Workshop (closed)	Workshop (closed) (5B)	Special Session (Tutorial 2) (6B)		Korean Paper Session (8B–P)
16:00 ~ 17:20 (80min) — 1C / 2C / 3C / 4C / 5C / 6C / 7C / 8C–P	Special Session (1C)	Special Session (2C)	Special Session (3C)	Workshop (closed) (4C)	Korean Paper Session (5C)	Special Session (Tutorial 3) (6C)	Keynote Speech (7C)	Korean Paper Session (8C–P)
17:30 ~ 19:30 (120min)	Keynote Speech & Reception (BlissHill Stay Wellnes Hall, 2F)						

Program at a Glance

February 1 (Thur) – Tower Condominium, 1F							
Venue / Time	Oral Session						Poster Session
	Hongsong	Cheoljuk	Jajak	Jumock	Opal	Sapphire	Crystal	Emerald

Time	Hongsong	Cheoljuk	Jajak	Jumock	Opal	Sapphire	Crystal	Emerald
08:00 ~ 17:00	Registration (Tower Condominium Lobby, 2F)							
08:30 ~ 09:40 (70min)	9A Special Session	10A Special Session	11A Special Session	12A English Paper 1 Chair: Dong Myung Lee (Tongmyong University)	13A Special Session	14A Haedong Best Paper Award	15A Special Session (Distinguished International Scholars 1)	16A-P Korean Paper Session
09:50 ~ 11:00 (70min)	9B Special Session	10B Special Session	11B Special Session	12B English Paper 2 Chair: Heejung Yu (Korea University)	Special Session	14B Korean Paper Session	15B Special Session	16B-P Korean Paper Session
11:10 ~ 12:20 (70min)	9C Special Session	10C Special Session	11C Special Session	12C English Paper 3 Chair: Jiho Song (Hanyang University)		14C Korean Paper Session	15C Keynote Speech	16C-P Korean Paper Session
12:20 ~ 14:00 (100min)	Lunch (Dragon Plaza 1F)							
14:00 ~ 15:10 (70min)	9D Special Session	10D Special Session	11D Special Session	12D English Paper 4 Chair: Lee, Jung Hoon (Hankuk University of Foreign Studies)	13D Special Session	14D Special Session (Startup)	15D Special Session (Distinguished International Scholars 2)	16D-P Korean Paper Session (Undergraduate Student Paper 1)
15:20 ~ 16:30 (70min)	9E Special Session	10E Special Session	11E Special Session	12E English Paper 5 Chair: Sang-Woon Jeon (Hanyang University)	13E Special Session		15E Special Session (Tutorial 4)	16E-P Korean Paper Session (Undergraduate Student Paper 2)
16:40 ~ 17:50 (70min)	9F Special Session	10F Korean Paper Session	11F Special Session	12F English Paper 6 Chair: Soo Young Shin (Kumoh National Institute of Technology)	Special Session	14F Korean Paper Session	15F Special Session (Junior Faculty Social Gathering)	16F Undergraduate Student Paper Awards

Program at a Glance

February 2 (Fri) – Tower Condominium, 1F							
Venue / Time	Oral Session						Poster Session
	Hongsong	Cheoljuk	Jajak	Jumock	Opal	Sapphire	Crystal	Emerald
08:30 ~ 11:30	Registration (Tower Condominium Lobby, 2F)							
08:30 ~ 09:50 (80min)	17A	18A	19A	20A	21A	22A	23A	24A–P
	Special Session	Workshop (closed)	Special Session	Special Session		Special Session (Tutorial 5)		Korean Paper Session
10:00 ~ 11:20 (80min)	17B	18B	19B	20B		22B		24B–P
	Korean Paper Session	Korean Paper Session	Korean Paper Session	Special Session	Special Session	Korean Paper Session	Special Session 〈Ideas Contest〉	Korean Paper Session
11:30 ~ 12:50 (80min)	17C	18C	19C	20C		22C		
	Special Session	Korean Paper Session	Korean Paper Session	Korean Paper Session		Korean Paper Session		

Oral Sessions February 1 (Thur)

12A English Paper 1

Chair : Dong Myung Lee (Tongmyong University)
Date : February 1 (Thur) / 08:30~09:40 / Jumock

12A-1   Index Modulated Orthogonal Time Frequency Space Multiplexing Assisted by Lower Order Modulations
Adnan Tariq,Won Jae Ryu,Soo Young Shin(국립금오공과대학교)

12A-2   PTP-based clock synchronization for delay measurement in Autonomous Vehicles
Anvarjon Yusupov,JongWon Kim(광주과학기술원)

12A-3   UAV with RTK GPS for Coverage Disaster Area Utilizing Genetic Algorithm
Ramdhan Nugraha,Fussy Mentari Dirgantara,Raehan Abdillah,Soo Young Shin(국립금오공과대학교)

12A-4   UAV based Inspection Framework for Crack Detection in GPS Denied Environment
Muhammad Imad,Muhammad Wicaksono,신수용(국립금오공과대학교)

12A-5   An Intent-Based Management Framework for Networks and Security in Software-Defined Vehicles
Jaehoon Jeong,Yiwen Shen(성균관대학교)

12A-6   Context-Aware Navigation Protocol for Safe Flying of Unmanned Aerial Vehicles
Bien Aime Mugabarigira,Jaehoon Jeong(성균관대학교)

12B English Paper 2

Chair : Heejung Yu (Korea University)
Date : February 1 (Thur) / 09:50~11:00 / Jumock

12B-1   Learnable Pixel-Based Encryption for Privacy-Preserving Image Classification
Ijaz Ahmad,Seokjoo Shin(조선대학교)

12B-2   Performance Analysis of YOLOv8: A Robust Approach for Aerial Object Detection
Fussy Mentari Dirgantara,Ramdhan Nugraha,Soo Young Shin(국립금오공과대학교)

12B-3   YOLOx Coupled With Multiscale Retinex for Vehicle Detection in Rainy and Foggy Conditions
Imran Ashraf,허수정,박용완(영남대학교)

12B-4   RNN for Non-Invasive Blood Pressure Prediction Based on PPG Signals
Syamsul Rizal,Dong-Seong Kim(ICT-CRC)

12B-5   Real-time Object Detection on a Custom Built Edge Device Using TensorFlow Lite
Md Javed Ahmed Shanto,Md Raihan Subhan,Dong-Seong Kim,Taesoo Jun(Kumoh National Institute of Technology)

12B-6   Deep Learning-Based Estimation of Blood Pressure and Anxiety Using PPG and ECG
Xiaohong Yu,Jaehoon Jeong,MiHye Park(성균관대학교)

Oral Sessions February 1 (Thur)

12C   English Paper 3

Chair : Jiho Song (Hanyang University)
Date   : February 1 (Thur) / 11:10~12:20 / Jumock

12C-1   Securing the Road Ahead: Blockchain for Enhanced Trust and Security in V2X Communication
Razafimanjato Mahalinoro,Haishan Yang,Donghyun Jeon,Bomi Jeong,Dongkyun Kim(경북대학교)

12C-2   Decentralized Metaverse Governance using Blockchain with Attribute-based Identity
Md Facklasur Rahaman,Mohtasin Golam,Esmot Ara Tuli,Dong-Seong Kim,Jae-Min Lee(Kumoh National Institute of Technology)

12C-3   Dynamic Programming-Based Multilevel Graph Partitioning for Large-Scale Graph Data
Sergio P. Caetano,유미리,최지헌,오상윤(아주대학교)

12C-4   Efficient Blockchain Decarbonization: A Hyperledger Besu Perspective on Emission Allowance Markets
Gifar Arif Haryadi,*Revin Naufal Alief,Jae-Min Lee,Dong-Seong Kim(국립금오공과대학교,*NS Lab Co., Ltd.)

12C-5   Elevating Transparency in Global Maritime Logistics through Blockchain Technology
Md Raihan Subhan,Mohtasin Golam,Md Facklasur Rahaman,Dong-Seong Kim,Taesoo Jun(Kumoh National Institute of Technology)

12C-6   Leveraging Blockchain for Access Control and Credential Integrity in the Metaverse Platform
Mohtasin Golam,Esmot Ara Tuli,Md Facklasur Rahaman,Dong-Seong Kim,Jae-Min Lee(Kumoh National Institute of Technology)

12D   English Paper 4

Chair : Lee, Jung Hoon (Hankuk University of Foreign Studies)
Date   : February 1 (Thur) / 14:00~15:10 / Jumock

12D-1   Hybrid SEFDM-IM and NOMA Systems A Synergistic Approach to Multi-User Networks in dynamic channel conditions
Faisal Ayub Khan,Soo Young Shin(Kumoh National Institute of Technology)

12D-2   Avoiding UWSN Paralysis: Multi-AUV Data Collection Approach
Nandyala Chandra Sukanya,Cho Ho-Shin(Kyungpook National University)

12D-3   Mutual Information of RIS assisted MIMO with imperfect channel state estimation
Suwanda Nadhira Azizah,*Hye Yeong Lee,Soo Young Shin(국립금오공과대학교,*ICT Convergence Research Center)

12D-4   Mobility State Classification in HetNets Using Machine Learning
Syed Maaz Shahid,Sungoh Kwon(울산대학교)

12D-5   An Empirical Analysis of 5G-NR MIMO Schemes under 3GPP Standards
MOHD ADNAN,Chaitali J. Pawase,*Sara Sualiheen,*장경희(Inha University,*인하대학교)

12D-6   The Impact of Packet Priority Transmission on 5G-NR-V2X Communications
Sawera,Jiawei Tian,장경희(인하대학교)

Oral Sessions February 1 (Thur)

12E   English Paper 5

Chair : Sang-Woon Jeon (Hanyang University)
Date : February 1 (Thur) / 15:20~16:30 / Jumock

12E-1   A Study on the Graphical Neural Network for Network Slicing for Beyond 5G Mobile Systems
M. Kowsalya,*박석우,**김형진,*나인호(Vellore Institute of Technology,*군산대학교,**전북대학교)

12E-2   Large-Scale MIMO in Sub-6 GHz and mmWave Wireless Networks: Practical Considerations and Use Cases
Muneeb Ahmad,신수용(국립금오공과대학교)

12E-3   Hybrid Computational Offloading in Terrestrial Networks using Uplink NOMA
Daniar Estu Widiyanti,Soo Young Shin(국립금오공과대학교)

12E-4   Terahertz Band Communication System with 1-bit ADC, Oversampling and Phase Compensation
Metasebia D. Gemeda,한민식,Ameha T. Abebe,강충구(고려대학교)

12E-5   Envisioning 6G Terahertz Communication for IoBNT Disease Detection Systems
Elaiyasuriyan Ganesan,Ho-Shin Cho(경북대학교)

12E-6   Performance Analysis of Quantum Reinforcement Learning for Different Quantum Encoding Schemes: UAV Trajectory Optimization Application
Silvirianti,Lia Suci Waliani,Soo Young Shin(국립금오공과대학교)

12F   English Paper 6

Chair : Soo Young Shin (Kumoh National Institute of Technology)
Date : February 1 (Thur) / 16:40~17:50 / Jumock

12F-1   Convolutional Neural Network-Based UAV Classification Using RF Fingerprints
Md Habibur Rahman,Mohammad Abrar Shakil Sejan,Jung-In Baik,Md Abdul Aziz,Rana Tabassum,Hyoung-Kyu Song(세종대학교)

12F-2   Intelligent Reflective Surface Assisted Wireless Communication BER Estimation LSTM vs BiLSTM
Mohammad Abrar Shakil Sejan,Md Habibur Rahman,Md Abdul Aziz,Rana Tabassum,Hyoung-Kyu Song(세종대학교)

12F-3   Marine Aquaculture Sensor Network Based On Sinusoidal Current Signal
Akbar Taufiqurrahman,Man Hee Lee,Soo Young Shin(국립금오공과대학교)

12F-4   채널 분포 정보를 활용한 위장 전이중 통신 차량용 은닉 통신 (Covert Communications for a Disguised Full-Duplex Vehicle With Channel Distribution Information)
Refat Khan,문지환(한밭대학교)

12F-5   Beamforming Optimization in Cell-Free MIMO: PCA-Quantum Learning Approach
Lia Suci Waliani,Silvirianti,Soo Young Shin(국립금오공과대학교)

12F-6   An Open-Source-Based Testbed and Experiment for 5G Mobile Networks
Yoseop Ahn,Yiwen Shen,Jaehoon Jeong(성균관대학교)

12F-7   NOMA-OFDM-IM for Random Access Uplink Transmission
Md. Shahriar Kamal,Muhammad Sajid Sarwar,신수용(Kumoh National Institute of Technology)

MEMO

MEMO

MEMO

HIGH-SPEED 16Gbps
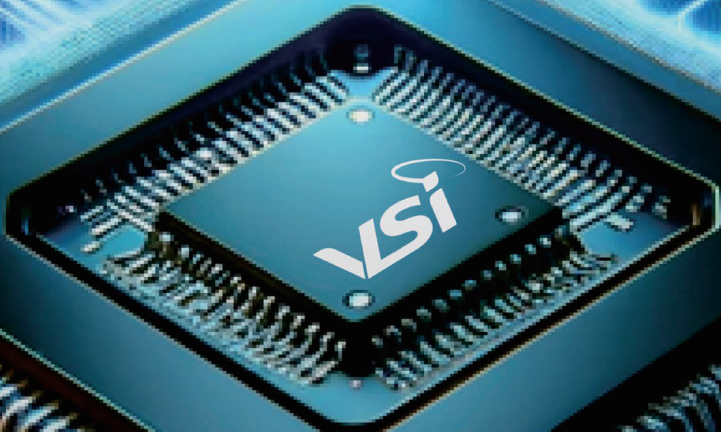
Ultra-low latency for real-time data transmission

16Gbps with proven PAM4 Ethernet technology

NI SDR 소프트웨어 정의 무선 통신 솔루션

소프트웨어 정의 무선통신(SDR)은 고급 무선 애플리케이션의 신속한 프로토타이핑과 배포를 가능하게 하는 RF 트랜시버 입니다.
SDR은 무선 통신, 신호 인텔리전스 시스템 배포 또는 멀티채널 테스트 베드를 위한 빌딩 블록으로 사용됩니다.
NI는 DC~7.2 GHz, 최대 1.6 GHz의 실시간 대역폭, 강력한 DSP 중심 FPGA, 핸드헬드 디바이스 부터 고채널-카운터-시스템까지
다양한 폼 팩터를 갖춘 SDR로 설계부터 실배치 까지 고객의 요구를 충족하여 드립니다.

NI USRP X440

X4 시리즈 라인업 중 가장 최신의 성능을 자랑하는 USRP X440에는 Zynq UltraScale+ RFSoC,
8x8 MIMO, 채널당 최대 1.6GHz의 대역폭이 포함되어 있습니다. 오픈 소스 소프트웨어만 지원합니다.

NI Ettus USRP X410

고성능 USRP X410은 1 MHz ~ 7.2 GHz의 넓은 주파수 범위와 400 MHz의 대역폭을 제공합니다.
4x4 MIMO가 가능하고 강력한 Zynq UltraScale+RFSoC가 포함된 USRP X410은 LabVIEW와
오픈 소스 소프트웨어를 모두 지원합니다.

X310 시리즈/ USRP RIO

이 고성능 PCI Express, 10 기가비트 이더넷 디바이스에는 강력한 Kintex-7 FPGA, 2x2 MIMO
트랜시버, 그리고 최대 160MHz의 대역폭을 제공합니다. 지원 LabVIEW와 오픈 소스 소프트웨어를
모두 지원합니다.

B 시리즈/USRP 290x

넓은 주파수 범위를 지원하는 비용 효율적인 USB SDR 이 컴팩트한 폼 팩터 이 장치는 최대
15MHz의 스트리밍 대역폭을 제공하며 LabVIEW와 오픈 소스 소프트웨어를 모두 지원합니다.

E 시리즈

전도 냉각 방식의 휴대용 독립형 SDR로, Zynq 시스템온칩(SoC), 2x2 MIMO 트랜시버,
56MHz의 대역폭을 제공합니다. 오픈소스 소프트웨어와만 호환됩니다.

N 시리즈

이 고성능 독립형 SDR에는 Zynq SoC, 2x2 MIMO 및 최대 128 x 128 위상 동기 시스템이
포함되어 있습니다. 200MHz의 대역폭을 제공하며 오픈 소스 소프트웨어와만 호환됩니다.

독립형 SDR

온보드 프로세서가 탑재된 고성능 SDR 독립형 애플리케이션용 프로세서 및 FPGA 애플리케이션을
위한 고성능 SDR로, 최대 160MHz의 대역폭과 MIMO 기능을 제공합니다. 특징 LabVIEW 및
오픈 소스 소프트웨어를 모두 지원합니다.

- 1 MHz ~ 7.2 GHz 주파수 범위 (최대 8 GHz)
- 1.6 GHz/채널의 대역폭
- 무선통신 라디오당 8개의 송신 및 수신 채널
- 로컬 오실레이터 가져오기/내보내기 동기화
- GPS 훈련 오실레이터(GPSDO)

- 랩뷰, 오픈소스 UHD, GNU 라디오, MathWorks MATLAB®과 같은 개발 툴
- Windows, Linux, OS X 등 OS 지원
- LabVIEW FPGA 및 RF 네트워크 온 칩(RFNoC) 프레임워크를 사용한 FPGA 개발
- 일부 모델에서 온보드 ARM 및 x86 프로세서 사용 가능
- USB, 기가비트 이더넷, 및 PCI Express

ICT Convergence Korea 2024

2024년 3월 13일(수) ~ 14일(목)

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