



KICS Fall Conference 2021 Program

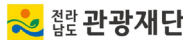
Date November 17(Wed) ~ 19(Fri), 2021

Venue The Ocean Resort, Yeosu, Korea

Organized by



Patrons



KICS Fall Conference 2021 Program

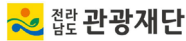
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KICS
The Korean Institute of
Communications and
Information Sciences

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Message from the Chairs

Dear KICS Members,

Amid the prolonged COVID-19 pandemic that has hit the world, we would like to express our gratitude to the members who are consistently working hard on R&D during this difficult time, and invite you to the KICS Fall Conference 2021.

At this conference, we will have regular general meetings to share and exchange the results of your research, reflect on the various activities of the society over the past year, and prepare for the following year. In particular, this year's conference will be held at Yeosu and is a three-day-long event to cover a wide variety of topics. Since this year's event will be in the early stages of the transition to the With Corona, we have prepared not only face-to-face offline events but also non-face-to-face online events. While strictly following the quarantine rules, we will do our best to ensure that the conference is safe and enjoyable for everyone who participates.

With the commercialization of 5G mobile communications, the competition to secure new 6G mobile communications technologies is increasing. As artificial intelligence converges diverse industrial fields and introduces innovations, we have noticed that the role of the Korean Telecommunications Society grows bigger. To this end, the Korea Telecommunications Society organized ICT Convergence Korea 2021, the largest ICT convergence event in Korea this year, AI Frontiers Summit, which looks at the current position and development direction of artificial intelligence. The successful hosting of these events shows that KICS leads innovations of information and communication technology, as well as artificial intelligence and convergence technology.

This year, we will have more than 500 academic papers in information technology, communication technology, and related convergence technologies. In addition, we will have Bang Seung-chan, the president of the Electronics and Telecommunications Research Institute, give an invitational lecture on "3D spatial media, communication, and metaverse". In the special session of Rising AI Start-ups, we will have experts from eight promising AI-related start-ups examine various AI applications and exchange the latest technologies. In addition, we will have tutorials on millimeter-band antennas, autonomous driving mobility, reinforcement learning, and low-orbit satellite-based non-terrestrial networks. We will also have special sessions organized by KICS societies and various research centers. We will host diverse programs such as undergraduate research contests. We would like to encourage all members to participate in this year's conference.

We hope that this event will be useful and valuable to all of our members. Also, we would like to express our deepest gratitude to the Winter/Fall conference members of KICS and the secretariat for their hard work in preparing this event.

Warm regards,

November, 2021



Young-Han Kim
KICS President



Jun Heo
Organizing
Committee Chair



Oh-Soon Shin
Technical Program
Committee Chair



Chan-Byoung Chae
Technical Program
Committee Chair



Sang-Hyo Kim
Technical Program
Committee Chair

Committees

General Chair Young-Han Kim (KICS President)

Technical Program Committee

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Sang-Hyo Kim (Sungkyunkwan University)

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Eun-Chan Park (Dongguk University)

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Ohyun Jo (Chungbuk National University)

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Seong Ho Chae (Korea Polytechnic University)

Seokchan Kim (Pusan National University)

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Sangheon Pack (Korea University)

Changhee Joo (Korea University)

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Sunwoong Choi (Kookmin University)

Sang Chul Kim (Kookmin University)

Jae Seung Song (Sejong University)

Dong-Seong Kim (Kumoh National Institute of Technology)

Special Program Committee

Members

Sungtek Kahng (Incheon National University)

Chung G. Kang (Korea University)

Hak Lim Ko (Hoseo University)

KIM GYOUNGBAE (Seowon University)

Dong Ku Kim (Yonsei University)

Dong-Seong Kim (Kumoh National Institute of Technology)

Sunwoo Kim (Hanyang University)

Jae-Hyun Kim (Ajou University)

Sae Woong Bahk (Seoul National University)

Baek Yong Soon (ETRI)

Hong-Yeop Song (Yonsei University)

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Il Woo Lee (ETRI)

Lim Yong-kon (Kookmin University)

Jung Woo Sung (ETRI)

Dong Seog Han (Kyungpook National University)

Sangheon Pack (Korea University)

Registration

Registration Fee

			Early Birds	On-Site	Note
Conference Registration	Member	Student	160 USD 160,000 KRW	210 USD 210,000 KRW	Reception/Banquet coupon is not included
		Regular/Life	240 USD 240,000 KRW	280 USD 280,000 KRW	
	Non-member	Student	190 USD 190,000 KRW	240 USD 240,000 KRW	Reception/Banquet coupon is not included
		Regular	300 USD 300,000 KRW	340 USD 340,000 KRW	
Undergraduate Student			60 USD 60,000 KRW	80 USD 80,000 KRW	Reception/Banquet coupon is not included
Tutorial Registration			Same as conference registration		

* USD 1.00 = ₩1,100 (Round down less than one hundred won)

Registration Policy

- To be published in the KICS Fall Conference 2021 Proceedings, 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.
- A valid student ID is required at the registration desk to check the eligibility for student-rate registration.
- Registrations include access to conference sessions, a program book, souvenirs, a luncheon (November 18, 2021).
- Non-refundable author registration fees must be paid prior to the early registration due (November 8, 2021).
- For non-author registrations, absolutely no cancellations/refunds will be accepted after the early registration due (November 8, 2021).

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 to 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.	1006-700-044564
Swift Code	HVBKCRSE
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 Fall Conference 2021 and find that you are unable to attend or cancel the paper, please notify KICS Fall Conference 2021 secretariat in writing to conference@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 (November 8, 2021).

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Post Conference

KICS Fall Conference 2021 publishes published papers at the Post-Conference of the Electronic Information Research and Information Center for sharing research information and communicating, and operates a bulletin board to enable questions and answers related to theses. (Real time and always operating)

► Post-Conference : www.eiric.or.kr

Date: November 17(Wed), 2021

Venue: Geomundo Room A



**Prof. Sungtek
Kahng**
(INU)

5G Antennas and Millimeter-Wave Devices Suiting Our Needs: Technologies & Issues (in English)

November 17(Wed), 13:00–14:20

Though the world seems to stop spinning in its steps for the better due to the COVID-19, R&D's for 5G mobile communication have not been stopped. Nobody dares to stop the fire since dream-advantages 5G mobile services will bring were promoted big time. So as to drive the advertisement of 5G into reality and handle people's craze on it, every part of the communication system from software to hardware should be viable to the same weights and equal level of completeness. In line with this, the area of antennas and RF components is essential to feasibility of the system. To cope with shortcomings and limitations of the conventional design methodologies in face of dense population in a smaller platform and vulnerability to interfering neighbors, new measures should be taken for the aforementioned core components.

Beamforming antennas for 5G connectivity are shown with novel approaches such as metamaterial feed circuitry for lower power-consumption and wide-band phase relationships and metasurface lenses(not convex but flat) for deterring propagation-loss of single-polarization and dual-polarization array antennas. They work for both handsets and base-stations as well. Given that the 5G beamforming function is driven by the chipset, it is worth observing causes of electromagnetic degradation and likelihood of failure in communication. This necessitates thorough EM analysis on all the layers of RFIC-combined beamformers and leads to trouble-shooting. Once and for all, project results on securing channel selectivity/beam-selection carried out by MiEMI-sol Lab. are demonstrated.

Tutorial

Date: November 17(Wed), 2021

Venue: Geomundo Room C



Prof. Soyi Jung
(HALLYM Univ.)

Research Trends in Future Autonomous Mobility: Scheduling, Optimization, and Learning

November 17(Wed), 13:00–14:20

본 발표에서는 커넥티드 카, 무인이동체를 포함한 미래 모빌리티 시스템에서 네트워크의 안정적인 운용을 위한 방안에 대하여 소개한다. 주로 강화학습 기반의 충전 스케줄링 문제, 고성능 컴퓨팅을 위한 아웃소싱 문제, 통신 전송 환경을 넓히기 위한 스케줄링 기술, 고속의 데이터 전송을 위한 최적화 문제에 대하여 소개한다.



Prof. Minhae Kwon
(SSU)

Modeling Minds: A Reinforcement Learning Perspective (in English)

November 17(Wed), 14:30–15:50

Life is a sequence of decisions. We perform decision-making tasks every moment. How do we make decisions? What are the hidden cognitive processes? In this tutorial, we aim to answer the questions from the perspective of reinforcement learning. Reinforcement learning provides a framework for the computational explanation of how an intelligent agent ought to take actions in an environment to maximize its benefit. We consider a partially observable scenario that would be realistic in the real world and introduce deep reinforcement learning as a tool to find the policy. In addition, we aim to find a model for the minds of others in multi-agent settings using the inverse rational control. Applications of mixed autonomy traffic, where a mixture of autonomous vehicles and human driving vehicles is present on the roads, and cooperative network formation of mobile robots will be discussed.



Prof. Wonjae Shin
(Ajou Univ.)

LEO Satellite Constellation Networks in 6G Era: Recent Trend, Opportunities, and Challenges

November 17(Wed), 16:00–17:20

최근 Starlink, Kuiper, OneWeb과 같은 군집 저궤도위성을 활용한 글로벌 인터넷 서비스 기술의 진화가 빠르게 진화하면서, 6G 비-지상 네트워크 (Non-Terrestrial Networks)에 대한 관심이 매우 높아지고 있다. 본 발표에서는 군집 저궤도위성 네트워크의 기술적인 challenges와 opportunities에 대해 먼저 알아보고, 향후 기술 발전 방향에 대해 알아본다.

Program at a Glance

Oral Session : November 17 (Wednesday) / The Ocean Resort Condominium (B2F)					
Track Time	Seminar Room A	Seminar Room B	Odongdo Room	Geomundo Room A	Geomundo Room C
13:00-14:20 (80min)	1A	2A	3A	4A	5A
	Korean Paper Session	Korean Paper Session	Korean Paper Session	Tutorial I (in English) Prof. Sungtek Kahng (INU)	Tutorial II Prof. Soyi Jung (HALLYM Univ.)
14:30-15:50 (80min)	1B	2B	3B	4B	5B
	Korean Paper Session	Korean Paper Session	Special Program	Korean Paper Session	Tutorial III (in English) Prof. Minhae Kwon (SSU)
16:00-17:20 (80min)	1C	2C	3C	4C	5C
	Special Program	Special Program	Special Program	Special Program	Tutorial IV Prof. Wonjae Shin (Ajou Univ.)

Program at a Glance

Oral Session : November 18 (Thursday) / The Ocean Resort Condominium (B2F)								
Track Time	Seminar Room A	Seminar Room B	Odongdo Room	Geomundo Room A	Geomundo Room C	Bellastar Hall (3F)	Virtual 1	Virtual 2
09:00-10:20 (80min)	6A	7A	8A	9A	10A	11A	12A	13A
	Korean Paper Session	Korean Paper Session	Korean Paper Session	Korean Paper Session	Korean Paper Session	Special Program	Korean Paper Session	Korean Paper Session
10:30-11:50 (80min)	6B	7B	8B	9B	10B	11B	12B	13B
	Korean Paper Session	Korean Paper Session	Special Program	Korean Paper Session	Special Program	Special Program	Korean Paper Session	Korean Paper Session
11:50-13:00 (70min)	Lunch Break							
13:00-14:20 (80min)	6C	7C	8C	9C	10C	11C	12C	13C
	Korean Paper Session	Korean Paper Session	Special Program	Korean Paper Session	Special Program	Special Program	Korean Paper Session	Korean Paper Session
14:30-15:50 (80min)	6D	7D	8D	9D	10D	11D	12D	13D
	Korean Paper Session	Korean Paper Session	Special Program	(Private) Special Program	Special Program	Special Program	Korean Paper Session	Korean Paper Session
16:00-17:20 (80min)	6E	7E	8E	9E	10E	11E	12E	13E
	Korean Paper Session	Korean Paper Session	Special Program	(Private) Special Program	Special Program		Special Program	Korean Paper Session
17:30-18:30 (60min)	Regular General Meeting							
18:30-20:00 (90min)	Keynote Speech & Banquet							

Program at a Glance

Poster Session : November 18 (Thursday)	
Track Time	Online(Presentation Video)
09:00-10:20 (80min)	14A : Poster Session I
10:30-11:50 (80min)	14B : Poster Session II
11:50-13:00 (70min)	Lunch Break
13:00-14:20 (80min)	14C : Poster session III
14:30-15:50 (80min)	14D : Poster Session IV
16:00-17:20 (80min)	14E : Poster Session V

Oral Session : November 19 (Friday) / The Ocean Resort Condominium (B2F)					
Track Time	Seminar Room A	Seminar Room B	Odongdo Room	Geomundo Room A	Geomundo Room C
08:30-09:50 (80min)	15A	16A	17A	18A	19A
	Korean Paper Session	Korean Paper Session	English Paper Session I	Korean Paper Session	Korean Paper Session
10:00-11:20 (80min)	15B	16B	17B	18B	19B
	Korean Paper Session	Korean Paper Session	English Paper Session II	Korean Paper Session	(Private) Special Program
11:30-12:50 (80min)	15C	16C	17C	18C	19C
	Korean Paper Session	Korean Paper Session	English Paper Session III	Korean Paper Session	(Private) Special Program

Oral Sessions November 19 (Friday)

17A English Paper Session I

Chair: Hyojung Ahn(KARI)

Date : November 19 (Friday) / 08:30-09:50, Odongdo Room

- 17A-1 Multi-Label Image Classification Using The Base Vision Transformer**
Hatem H.M kamal Ibrahim and Hyun-Soo Kang(Chungbuk National University, Korea)
- 17A-2 Deep Learning Based Two Head Network for Prediction of Unknown Classes**
Kan Jiang(JeonBuk National University, Korea)
- 17A-3 Pseudo Colorization Using CNN Model For X-ray Baggage Scan Image**
Bilel Yagoub and Hyun-Soo Kang(Chungbuk National University, Korea)
- 17A-4 Fast Light Field Image Super-Resolution Using Residual Networks**
Ahmed Salem, Hatem H.M kamal Ibrahim and Hyun-Soo Kang(Chungbuk National University, Korea)
- 17A-5 A Robust MP3 Compression-Resistant Audio Watermarking Algorithm Based on DWT-SMM**
Muhammad Rasyid Ansori and Simeon Ajakwe; Jae Min Lee and Dong Seong Kim(Kumoh National Institute of Technology, Gumi, Korea)
- 17A-6 Feature Selection: Implications and Applications in Machine Learning**
Gabriel Amaizu, Jae-Min Lee and Dong Seong Kim(Kumoh National Institute of Technology, Korea)
- 17A-7 A Q-learning-based Opportunistic Routing Protocol for Internet of Underwater Things**
Sukanya Chandra Nandyala and Ho-Shin Cho(Kyungpook National University, Korea)
- 17A-8 Analysis of analog neuron circuit using 180nm CMOS process for Brain-Inspired Neural Networks**
Md Nazmul Haque, Samiur Rahman Khan, *Mohammad Khaleqi Qaleh Jooq, AlaaDdin Al-Shidaifat, Hanjung Song (INJE University, Korea, *Shahid Beheshti University, Iran)
- 17A-9 A study on different memristor model for neuromorphic applications**
Samiur Rahman Khan, Md Nazmul Haque, *Mohammad Khaleqi Qaleh Jooq, AlaaDdin Al-Shidaifat, Hanjung Song (INJE University, Korea, *Shahid Beheshti University, Iran)

17B English Paper Session II

Chair: SOO YOUNG SHIN(Kumoh National Institute of Technology)

Date : November 19 (Friday) / 10:00-11:20, Odongdo Room

- 17B-1 Covert communication in two-way relay systems**
Boya Ju and Zhilin Fu; *Mengru Wu; Inkyu Lee(Korea University, Korea, *Northeastern University, China)
- 17B-2 Effects of Detection Threshold on Concentration Shift Keying for Molecular Communications with Multiple Transmitters**
Ethungshan Shitiri and Ho-Shin Cho(Kyungpook National University, Korea)
- 17B-3 Energy Distribution and Source Location Privacy Protection in Event Monitoring Wireless Networks**
Lilian Mutalemwa and Seokjoo Shin(Chosun University, Korea)
- 17B-4 On a Reconfigurable Intelligent Surface-aided Relay Network Architecture for Underwater Acoustic Sensor Networks**
Faisal Ahmed, Ethungshan Shitiri and Ho-Shin Cho(Kyungpook National University, Korea)

Oral Sessions November 19 (Friday)

- 17B-5 UAV Assisted Real-Time Detection and Recognition of Citrus Disease in Smart Farm using Deep Learning**
Vivian Ukamaka Ihekoronye; Simeon Ajakwe; Dong Seong Kim and Jae Min Lee(Kumoh National Institute of Technology, Korea)
- 17B-6 A Low Computational Cost Sensor-Based Human Activity Recognition using Hybrid-LSTM in Edge Computing Environment**
Ahmad Zainudin, Adinda Riztia Putri, Goodness Oluchi Anyanwu, Cosmas Ifeanyi Nwakanma, Dong Seong Kim and Jae Min Lee(Kumoh National Institute of Technology, Korea)
- 17B-7 An Overview of 5G Wireless 3D Monitoring**
Mark Verana; *Made Adi Paramartha Putra; Revin Naufal Alief, Dong Seong Kim and Jae Min Lee(Kumoh National Institute of Technology, Korea, *Kumoh National Institute of Technology & IT Convergence Engineering, Korea)
- 17B-8 Analytical Design of Dual-Band and Wideband Balanced U-Shaped Power Divider**
Jatoth Deepak naik; Hanjung Song; AlaaDdin Al-Shidaifat and Sweet Verma; *Sandeep Kumar(INJE University, Korea, *National Institute of Technology, Karnataka, India)
- 17B-9 A Detection Algorithm Design based on Image Segmentation Strategy for Vehicle Damage Recognition**
Min Htet Thar, Cheol Min Lee and Dong Myung Lee(Tongmyong University, Korea)

17C English Paper Session III

Chair: Minhae Kwon (Soongsil University)

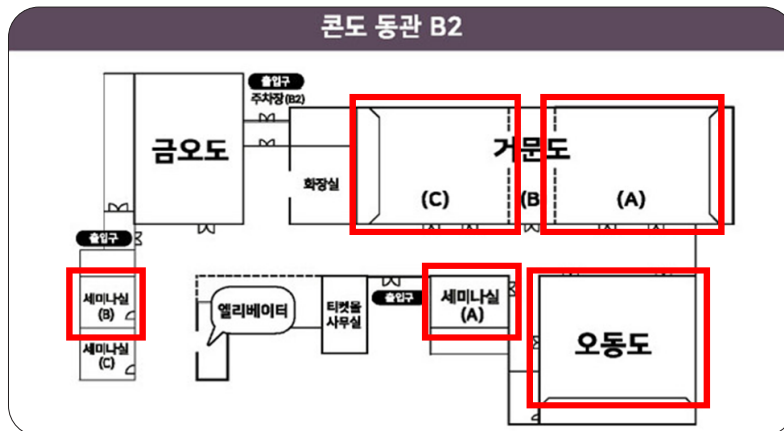
Date : November 19 (Friday) / 11:30-12:50, Odongdo Room

- 17C-1 Smart Building HVAC Monitoring using Thermal Sensor for Occupancy Estimation**
Cosmas Ifeanyi Nwakanma, Dong Seong Kim and Jae Min Lee(Kumoh National Institute of Technology, Korea)
- 17C-2 A Sequential Drug Release Scheme among Multiple Nanomachines**
Tania Islam, Ethungshan Shitiri and Ho-Shin Cho(Kyungpook National University, Korea)
- 17C-3 Breathing Rate Monitoring using Ensemble Learning in Smart Factory**
Fabliha Bushra Islam, Jae Min Lee and Dong Seong Kim(Kumoh National Institute of Technology, Korea)
- 17C-4 Fault Detection in 3D Printers using an Improved YOLOv5 with Hyperparameter Tuning**
*Made Adi Paramartha Putra; Mark Verana, Revin Naufal Alief, Dong Seong Kim and Jae Min Lee(*Kumoh National Institute of Technology & IT Convergence Engineering, Korea, Kumoh National Institute of Technology, Korea)
- 17C-5 Fast Sensor Data Recovery using Multi-Directional LSTM for Industrial Wireless Sensor**
Adinda Riztia Putri, Mareska Pratiwi Maharani, Ade Pitra Hermawan, Jae-Min Lee and Dong Seong Kim(Kumoh National Institute of Technology, Korea)
- 17C-6 Multiple Sensors Scheme on 3D Printing for Monitoring and Fault Detection**
Revin Naufal Alief; Muhammad Rasyid Ansori; Mark Verana; *Made Adi Paramartha Putra; Jae-Min Lee and Dong Seong Kim(Kumoh National Institute of Technology, Korea, *Kumoh National Institute of Technology & IT Convergence Engineering, Korea)
- 17C-7 MP3 Compression Robust Synchronized Audio Watermarking using QIM on Internet of Things**
Allwinnaldo Allwinnaldo; Jae-Min Lee and Dong Seong Kim(*Telkom University, Indonesia, Kumoh National Institute of Technology, Korea)
- 17C-8 Traffic Classification for Imbalanced Data Using CNN**
*Syifa Maliah Rachmawati, Dong Seong Kim and Jae Min Lee(Kumoh National Institute of Technology, Korea)

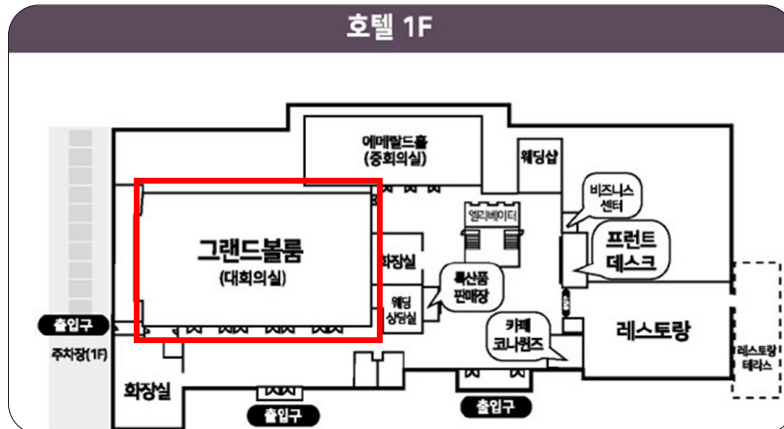
Session Room Location (The Ocean Resort, Yeosu, Korea)



콘도 동관 B2



호텔 1F



5G/6G 핵심 네트워크 기술 단기강좌: 표준/오픈소스에서 실습까지

Workshop on Emerging NET Technologies for 5G/6G:
From Standards/Open Sources to Practices

📺 Online 워크숍

|일 시| 2021년 11월 24일(수)~25일(목)

|주 최| 한국통신학회

|후 원| 숭실대학교 인터넷인프라시스템 기술연구센터
고려대학교 Self-Driving B5G 기초연구실

KICS :::::
한 국 통 신 학 회



* 문의 : 한국통신학회 사무국 convention@kics.or.kr 02-3453-5555(내선 4)

스마트팩토리도 U+가 앞서갑니다

U+ 스마트팩토리

LG유플러스는 5G 주파수인 3.5GHz와 28GHz 주파수 대역을 기반으로 빅데이터, AI, 클라우드 등 첨단 기술을 접목해 더 안전하고 더 효율적인 스마트 팩토리를 만들어 가고 있습니다



U+ 스마트팩토리 핵심 솔루션



U+ 모터진단
빅데이터를 통해
모터의 고장을 미리 파악



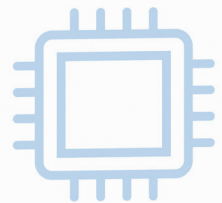
U+ 배전반진단
각종 센서로 과열 방전 등
전력 사고를 미연에 방지



U+ 지능형영상보안
AI 영상으로 안전 및
보안에 신속히 대응



U+ 대기환경진단솔루션
대기 오염 물질
배출량 및 확산 모니터링



오늘의 나누기가 내일의 곱하기로

11월 1일,
SK텔레콤이
SK telecom과
SK square로 분할합니다

SK telecom은
통신을 뛰어넘어
AI & 디지털 인프라 서비스로
고객의 가치를 더하고

SK square는
'제공하다'라는 뜻의 이름처럼
새로운 기술과 가능성에 투자해
미래의 가치를 제공합니다

지켜봐 주세요
SK telecom과 SK square,
세상의 가치를 키워갈 두 회사가
더 큰 내일을 시작합니다



SAMSUNG



**나를
새로
활짝**

Galaxy Z Flip3

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