

## Electrical/Electronic Engineering and Information Technology

### Schedule

#### Science and Technology Divisions

Built environment and Engineering design

Basic Science

Chemical Engineering and Material Science

Environment and Energy

**Electrical/Electronic Engineering and Information Technology**

Life Science and Health

Mechanical and Aerospace Science Engineering

Marine and Ocean Engineering

Others

#### Industry Forum

Hydrogen & Power to X Technologies

Marine Applications

Offshore Wind

Emerging Trends of IT Industry

Others

#### Special Sessions

#### Plenary Speakers

#### Keynote Speakers

#### Invited Speakers

### Electrical/Electronics Engineering & Information Technology

Electrical-electronics engineering and computer science are rapidly evolving fields, with new advancements and emerging at an unprecedented pace. This division will explore the latest trends and future directions in these fields, highlighting the cutting-edge research and development that is driving innovation across a wide range of industries.

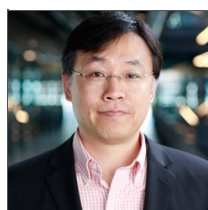
We will discuss various topics including the latest developments in hardware and software, the role of artificial intelligence and machine learning, and the impact of these technologies on many industries.

Sessions will feature distinguished experts from academia and industry who will share their insights and experiences in their respective fields. Attendees will have the opportunity to engage in a thought-provoking discussion on the current state of electrical-electronics engineering and computer science, and the opportunities and challenges that lie ahead. We hope the sessions will inspire attendees to explore new ideas and to collaborate with their peers to push the boundaries of these exciting fields.

Six sessions will be organized in the EI division at EKC 2023.

- AR/VR technologies
- Theory and practice of computer science and innovative information technology
- Innovative semiconductor devices and circuits, packaging and systems, and their scientific and industrial applications
- Technologies and environments for Web 3.0
- Micro and Nano Systems (From device to integrated systems)
- To the Edge and Beyond AI in Computer Vision

## Program Committee



**Dr. Dooyoung Hah**

ASCOF

dooyoung633@gmail.com

Dooyoung Hah received the Ph.D. degree in Electrical Engineering from Korea in 2000. He is currently an Assistant Professor of Electrical and Electronics Engineering at the Abdullah Gul University, Turkey. Before joining AGU, he has worked at the Louisiana State University, the University of California, Los Angeles, and the Electronics and Telecommunications Research Institute (ETRI). His research interests include sensors, energy devices, optics, RF devices, microsystems, and nanotechnologies.

Jae-Sung An received a Ph. D. degree from Hanyang University, Seoul, Korea in 2018, he was with Leading UI Co., Ltd., Anyang, South Korea. He joined the Instrumentation Laboratory of Delft University of Technology, Netherlands in 2020. He had been investigating the ultrasound imaging system until Dec. 2020 he joined SONY Europe design center in Norway to develop the CMOS image sensors for automotive applications. His work had focused on the high-precision image sensors.

**Dr. Jae-Sung An**

KSSEA

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integrated circuit design, driving and sensing schemes for many sensor  
has authored or co-authored 5 patents and over 23 technical papers in  
four International Solid-State Circuits Conference (ISSCC) papers with dem

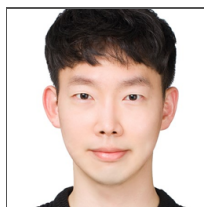
## Sessions

### [E11] Technologies of AR and VR

**Date & Time** 2023-08-15 10:50

**Room** Orion 1

#### Chair(s)

**Dr. Ji Yong Jeong**

**Sony, Europe Technology  
Development Center**

*jiyong.jeong@sony.com*

Ji Yong Jeong received the Ph.D. degree in Electronic Engineering from Hanyang University, Korea in 2022. His main research interests were biomedical imaging systems, microdisplay, and CMOS sensor. He joined Sony Technology Development Center, Italy, in 2022, where he has been involved in the development of systems, IC architectures and circuit designs for sensors. His current research interests are mainly Flight sensors including pixel devices, mixed-signal circuit fabrications, and image processing algorithms.

#### Synopsis

Augmented reality (AR) and virtual reality (VR) are emerging technologies that provide a variety of experiences to users with regard to from simply providing complementary information to having fully virtual environments. These technologies have been treated as having a huge potential. However, the real implementation of them tended to be pessimistic mostly due to hardware limitations. But, many inventions in CES 2023 proved that technologies for AR and VR had big steps forward sufficiently show a new generation would become much earlier than many people expected.

For the successful realization of AR and VR, breakthroughs in hardware technologies are critically demanded. It includes not only processors but also display and sensing systems. Display systems fully charge of what can be visualized to humans, and many devices including liquid crystal display (LCD), liquid crystal-on-silicon (LCOS), organic-light-emitting-diode-on-silicon (OLEDs) and Also, sensing systems manage to collect required information from humans for agile response. Many sensors including RGB, time-of-flight (ToF), touch, and inertial measurement units. Both technologies are very critical to realize AR and VR in terms of the immersiveness.

This session is proposed to share recently emerging technological developments for AR and VR and are particularly related to display and sensing systems. Through this session, all the participants are expected to be able to understand the current status of hardware developments for AR and VR.

#### Speakers

##### Image sensing technology for AR/VR applications

Jiwon Lee (Hanyang University ERICA)

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### High Data Compression of Micro-display with a Foveated Rendering for Virtual Reality

Bong-Choon Kwak (LG Display)

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### Metaverse With XR Interactions and Experience-Centric AI: A Trial for Conversational Voice Bot

Dr. Junseong Bang (ETRI)

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## [E12] Micro and Nano Systems (From device to integrated systems)

**Date & Time** 2023-08-15 13:20

**Room** Orion 1

### Chair(s)



**Dr. Seonho Seok**  
C2N-CNRS-University of Paris  
Saclay  
*seonho.seok@c2n.upsaclay.fr*

Seonho Seok received the M.S. and Ph. D. degrees in engineering from Seoul National University, Seoul, Korea, in 2000 and 2004, respectively. He was a postdoctoral researcher at the Center for Advanced Transceiver Systems (CATS), Seoul National University and at IEMN, CNRS in France from 2004 to 2007. He worked as a permanent researcher of CNRS from 2007 to 2014. Starting from March 2014, he is in the micro-nano systems and biotechnologies team in C2N (Nanosciences and Nanotechnologies)-University Paris. His current research interests are wafer-level (vacuum) transfer technique based on adhesion engineering (heterogeneous) integration, MEMS and sensors, 3D flexible electronics, energy harvesting and related modelling etc.



**Prof. Jung Mu Kim**  
Jeonbuk National University  
*jungmukim@jbnu.ac.kr*

Jung-Mu Kim received M.S. and PhD degrees in engineering and computer science from Seoul National University, Seoul, Korea, in 2002 and 2007, respectively. In 2007 to 2008, he was a Postdoctoral Fellow at UC San Diego. In 2008, he joined the faculty of School of Electronic Engineering, Jeonbuk National University where he is currently a full professor. He is a visiting professor at the end of August 2023 in Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain. He has led NATO SPS projects leading by CTTC as a partner country two times and won the prize for excellent collaborative multi-year science projects in the fields of advanced technology in 2018. His research interests include the IMU, SPR, MEMS/metasurface for 5G/6G and ink-jet printing, 3D based printed electronics, and packaging.

### Synopsis

Evolution in IC (Integrated Circuit) packaging technology has been driven by the need for high

and higher density devices enabling smaller form factor and lower power consumption. For example, HBM (High Bandwidth Memory) has been developed by stacking memory die based on TSV (Through-Silicon Vias) and stacking with micro-bump bonding in order to achieve higher bandwidth and lower power consumption. Furthermore, R&D effort and business drivers to speed up the development of application of "More than Moore" that are based upon or derived from silicon technologies but do not scale with Moore's law (with typical examples as RF, Power/HV, Sensor/Actuator/MEMS, SiP, SSL, etc.). Therefore, micro and nanosystems attracts more and more interests. For a more Moore or more-than-Moore. This session will reveal the recent research trends and outlook of micro and nano systems for future more-than-Moore era.

### Speakers

#### Advanced Manufacturing Technologies for Printing Composite Materials for Energy and Medical Applications

Jaemin Lee (University of Leeds)

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#### Processing-In-Memory with Self-Rectifying Resistive Crossbar Array

Nam-Seog Kim (Chungbuk National University)

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#### SENTENNA with hand grip sensing

Prof. Jung Mu Kim (Jeonbuk National University)

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#### Study on cyclic tensile behaviours of PDMS/MWCNTs micro-composite films

KYU SONG (Seoul National University of Science and Technology)

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EKC2023

Programme

Registration

Social

Venue

#### Aptasensor

Jai Eun An (SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University)

1

#### Wireless sensor node and wearable gas sensing technology for security applications.

Ignacio Llamas-Garro (CTTC)

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### [E13] Theory and practice of computer science and innovative information technology

**Date & Time** 2023-08-16 13:00

**Room** Hörsaal

**Chair(s)**

**Dr. Juhoon Kim**  
Deutsche Telekom AG  
*kimjuhoon@gmail.com*

Juhoon Kim is working at Deutsche Telekom AG. Within the company, he is mainly responsible for the technology impact and for the management of the standardization project. He is also working on several projects which focus on new networking paradigm: Software-defined Networking (SDN), Network Virtualization (NFV), and Next Generation Mobile (NGMN/5G). Previously, he received Ph.D. and M.Sc. Computer Science from TU Berlin.

**Synopsis**

The traditional Computer Science and Information Technology that deal with algorithm, data, have been undergoing evolutionary changes over the last decades and modifying our daily lives in every aspects including entertainment, housekeeping, communication, healthcare, industry, and commute. Advancement in software development paradigms, enhancement of the computing networking infrastructure, and development of underlying philosophy in technology are apparent enablers of such an evolution. This session focuses on generic Computer Science and ICT technology, thus aims to invite and select speakers who deliver their recent research work from academia and industry.

**Speakers****Automotive Software Architecture & Open Source Projects**

Changhyeok Bae (MBition)

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**On scientific knowledge and approaches to develop technologies**

Jae Sook Cheong (Bayreuth University)

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**The Effect of Different Auditory Feedbacks on Interpersonal Coordination**

Tonghun Hwang (Leibniz University Hannover)

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**[E14] Innovative semiconductor devices and circuits, packaging and systems, and their scientific and industrial applications.**

**Date & Time** 2023-08-16 14:50

**Room** Hörsaal

**Chair(s)**

Jung Han Choi received the doctor degree (Dr.-Ing.) from the Technical University of Munich, Munich, Germany in 2001. From 2001 to 2004, he was a research scientist in the Institute of Frequency engineering at the Technical University of Munich, Germany. From 2005 to 2011, he was with the Advanced Institute of Technology and the Samsung Electronics Co., Ltd.

**Dr. Jung Han Choi**

Fraunhofer Heinrich-Hertz  
Institute

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& Communication Research Center where he worked on bio-health sensor, nano devices and RF/millimeter-wave design including 60 GHz Si CMOS ICs. In 2011 he joined Fraunhofer Institute (Heinrich-Hertz Institute), Berlin and holds a tenured position. Now he is working on power high data bit rate transmitter and receiver for optical communications, microwave devices, electromagnetic simulations, and network analyzer measurement up to 100 GHz. In 2003, he was awarded for the IEEE EECOM (Electronic Engineering for Communication) Innovation Award for the contribution to the development of the receiver circuit. He was also co-recipient of EuMIC for the European Microwave Integrated Circuits Conference. His current research interests range from microwave active devices & IC, electromagnetic simulation & analysis, and metamaterials. He holds 19 international registered patents in the area of semiconductor devices and systems for high-frequency engineering. He has published 10 books and 3 book chapters.

**Dr. Heungjae Choi**

Cardiff University, Wales, UK

*choih1@cardiff.ac.uk*

Dr Heungjae Choi is a Lecturer in High Frequency Engineering at Cardiff University, Wales, UK. His research interests include the wafer characterisation of active and passive semiconductor devices, RF-IV waveform measurement and engineering, harmonic loadpull, high efficiency power amplifiers, microwave material characterization and sensing, with an emphasis on interdisciplinary aspects of applied microwaves in tackling real-world challenges.

## Synopsis

Rapid advances in semiconductor technologies, wide bandgap compound semiconductors such as GaN, high frequency materials and electronics, and the next generation wired and wireless communication systems allow us to deliver benefits to the society that have not been possible before, for example, 5G/6G, Internet of Things (IoT), and high-speed lower-power data centers. In parallel to this, the unique properties of electromagnetic waves enable the use of RF and Microwave technology as a platform for interdisciplinary research projects in tackling global challenges: non-invasive physiological signal monitoring and rapid diagnosis of infectious diseases. This session not only focuses on RF and microwave circuits and system design for the next generation wireless and wired communications, but also aims to invite researchers from fundamental Science and industry involved in interdisciplinary research projects who work with RF and microwave technology.

## Speakers

### Semiconductor Optical Sensors and Applications: A Case Study on Sensor Development through TCAD Simulation

Jong Mun Park (ams-OSRAM AG)

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### A New Design Method of Bandpass Filter Considering Frequency Variations for Wide Bandwidth

Youna Jang (Soonchunhyang University)

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### High-frequency ICs for optical interconnection and packages using flexible substrate technology

Dr. Junghan Choi (Fraunhofer Heinrich-Hertz Institute)

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### Policy trends of spectrum for the next generation broadband mobile from non-technical viewpoints

Dr. Juhoon Kim (Deutsche Telekom AG)

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### The GaN HEMTs technology for beyond 5G and microwave energy application

Dr. June Sik Kwak (RFHIC Inc.)

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### The Present State and Challenges of 4H-SiC Power Devices

Minwho Lim (Fraunhofer IISB)

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### A Study on applied ceramic packages with high heat dissipation and low loss for 5G communication

Juwan Kim (RF Materials Co.,Ltd.)

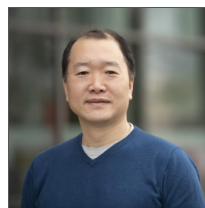
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## [E15] Technologies and environments for Web 3.0

**Date & Time** 2023-08-17 14:00

**Room** Hörsaal

### Chair(s)



**Prof. Young Saeng Park**  
WMG, University of Warwick  
[y.s.park@warwick.ac.uk](mailto:y.s.park@warwick.ac.uk)

Dr Young Saeng Park is currently working as an Associate Professor at WMG, University of Warwick. He also leads the Automation Systems group at WMG as a system manager. He has been a research fellow for 12 years. He has significant experience in research and development for manufacturing sector, including industrial systems, virtual engineering tool, virtual commissioning and physical systems. He has not only led various development projects for automation systems, but also has project experience on various platforms and frameworks. His current interests are cyber physical systems, manufacturing engineering, user experience for manufacturing and machine learning for Internet of things, web technology 3.0.

### Synopsis

Web 1.0 simply provided static information to users, and Web 2.0 allowed users to participate in information through platform-based services provided by tech giants. Now, the World Wide Web

undergoing another change. Unlike Web 2.0, Web 3.0 aims to be a fully decentralized, transparent, and secure environment where these infrastructure and applications will displace central giants, and individuals will be able to rightfully own their data.

For Web 3.0 to be successful, research and integration are required in various technologies, blockchain, artificial intelligence and machine learning, AR and VR, edge computing, metaverse, ubiquitous connectivity, etc. In particular, new types of values, services and applications have been introduced based on blockchain which is the most important technology of decentralization, non-fungible token (NFT), decentralised finance (DeFi), cryptocurrency (Crypto), decentralised applications (dApp), distributed ledger technology (DLT), decentralised exchanges (DEX), decentralised autonomous organisation (DAO), etc. However, Web 3.0 is still in the early stage where the technologies and services have not been accurately established and it is often criticised as being nothing more than an insubstantial marketing term.

Nevertheless, Web 3.0 is a new era that we are facing or will face soon, and we must systematically prepare for it. In this session, we will explore not only technologies required for Web 3.0 but also discuss in various environments considering legal, institutional, governmental aspects.

## Speakers

### Behavioural Sequence Prediction Model using Digital Footprint from IoT Device – Economics of Learning in Prediction

Youngseok Choi (Kingston University London)

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### Trilemma of Federated Learning: Privacy, Accuracy and Fairness

Kangsoo Jung (Inria)

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### Understanding the Design of User Experience and User Interface in Web 3.0

Prof. Young Saeng Park (WMG, University of Warwick)

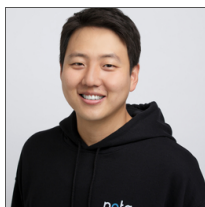
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## [EI6] To the Edge and Beyond AI in Computer Vision

**Date & Time** 2023-08-17 15:50

**Room** Hörsaal

### Chair(s)



**Dr. Seul-Ki Yeom**

Nota AI GmbH

skyeom@nota.ai

Seul-Ki Yeom received a Ph.D. degree in Brain Interfacing from Korea University, in 2018. From 2018 he was associated to the Machine Learning Group at Universität Berlin. Since 2020, Seul-Ki holds a position as a Senior Researcher at Nota AI GmbH. His research interests include brain-computer interface, machine learning, and data compression.



## Synopsis

Within the last decade, advances in Deep Learning, coupled with the large, freely available computing resources, have resulted in remarkable progress in the computer vision (CV), natural language processing (NLP), and broader artificial intelligence (AI) communities. Many academics and industries are also involved in developing/researching AI with Machine Learning to accelerate scientific discovery and engineering design in diverse application domains (e.g. Computer Vision, AlphaGo Zero, etc).

However, research in the AI field also shows that their performance on ranging from edge-device to performance computing (e.g. Cloud server) is still far from practical towards open-world data scenarios. Besides the accuracy that is widely concerned in deep learning, the phenomena are significantly related to the studies about AI model efficiency and robustness, which we abstract as "the Edge and Beyond AI".

In this reason, this workshop focuses on an emerging and impactful topic efficient artificial intelligence, especially in computer vision field which is one of the most popular and practical fields in AI such as driving monitoring system, intelligence transportation system, etc. It aims to discuss the challenges in applying AI to specific science and engineering problem in computer vision on machine learning methods.

It will feature a host of invited talks covering a variety of topics in AI in CV through several days with experts as follows,

1. AI model compression techniques on edge device (pruning, quantization, etc.)
2. CV applications in AI
3. Medical image processing based on machine learning

## Speakers

**Deep learning models outperform across domain, but how to utilize it properly?**

Hee Kim (Heidelberg University Faculty of Medicine in Mannheim)

1

**A deep learning based visual odometry approach for aerial navigation**

Dr. Jeongmin Kang (Department of Electrical Engineering, Automatic Control, Linköping University)

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**Overview of Magnetic Resonance Imaging Reconstruction Methods using Various Constraints to Solve the Ill-posed Problem**

Jinho Kim (Friedrich-Alexander-Universität Erlangen-Nürnberg / Siemens Healthineers GmbH)

1

**Automatic Neural Network Pruning that Efficiently Preserves the Model Accuracy**

Dr. Seul-Ki Yeom (Nota AI GmbH)

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**Innovative Global Cooperation in  
Academia and Industry**

## Contacts

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