Electrical/Electronic Engineering and Information Technology

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 fiel highlighting the cutting-edge research and development that is driving innovation across a wide range of industri

We will discuss various topics including the latest developments in hardware and software, the role of artificial in 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 experie fields. Attendees will have the opportunity to engage in a thought-provoking discussion on the current state of el electronics engineering and computer science, and the opportunities and challenges that lie ahead. We hope tha sessions will inspire attendees to explore new ideas and to collaborate with their peers to push the boundaries o 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 appli
- 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
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Dooyoung Hah received the Ph.D. degree in Electrical Engineering fror Korea in 2000. He is currently an Assistant Professor of Electrical anc Engineering at the Abdullah Gul University, Turkey. Before joining A University, he has worked at the Louisiana State University, the U California, Los Angeles, and the Electronics and Telecommunicatio Institute (ETRI). His research interests include sensors, energy device optics, RF devices, microsystems, and nanotechnologies.

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

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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 i four International Solid-State Circuits Conference (ISSCC) papers with dem

Sessions

[EI1] 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 E from Hanyang University, Korea in 2022. His main were biomedical imaging sysetms, microdisplay, and C sensor. He joined Sony Technology Development Cen Italy, in 2022, where he has been involved in the re development of systems, IC architectures and circuits sensors. His current research interests are mainly Flight sensors including pixel devices, mixed-signal cir fabrications, and image processing algorithms.

Synopsis

Augmented reality (AR) and virtual reality (VR) are emerging technologies that provide a var expériences to users with regard to from simply providing complementary information to hav fully virtual environments. These technologies have been treated as having a huge potential 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 for 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 cr demanded. It includes not only processors but also display and sensing systems. Display sy fully charge of what can be visualized to humans, and many devices including liquid crystal d (LCD), liquid crystal-on-silicon (LCos), organic-light-emitting-diode-on-silicon (OLEDoS) and Also, sensing systems manage to collect required information from humans for agile respons many sensors including RGB, time-of-flight (ToF), touch, and inertial measurement units. Bo technologies are very critial to realize AR and VR in terms of the immersiveness.
This session is proposed to share recently emerging technological developments for AR and are particularly related to display and sensing systems. Through this session, all the particip expected to be able to understand the current status of hardware developments for AR and

Speakers

Image sensing technology for AR/VR applications

Jiwon Lee (Hanyang University ERICA) 1

[EI2] 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 i engineering from Seoul National University, Seoul, Ko and 2004, respectively. He was a postdoctoral res Center for Advanced Transceiver Systems (CATS) National University and at IEMN, CNRS in France fro 2007. He worked as a permanent researcher of CNI from 2007 to 2014. Starting from March 2014, he is micro-nano systems and biotechnologies team in C2N Nanosciences and Nanotechnologies)-University Paris current research interests are wafer-level (vacuum) transfer technique based on adhesion engine (heterogeneous) integration, MEMS and sensors, 3D flexible electronics, energy harvesting and related m modellings etc.

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

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

Synopsis

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

and higher density devices enabling smaller form factor and lower power consumption. For e
HBM (High Bandwidth Memory) has been developed by stacking memory die based on TSV
Silicon Vias) and stacking with micro-bump bonding in order to achieve higher bandwidth an
power consumption. Furthermore, R&D effort and business drivers to speed up the developr
application of “More than Moore” that are based upon or derived from silicon technologies bu
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 re
more-moore or more-than-moore. This session will reveals the recent research trends and o
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) 1

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

Nam-Seog Kim (Chungbuk National University) 1

SENTENNA with hand grip sensing

Prof. Jung Mu Kim (Jeonbuk National University) 1

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

KYU SONG (Seoul National University of Science and Technology) 1

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) 1

[EI3] 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 ir Within the company, he is mainly responsible for the the technology impact and for the management o standardization project. He is also working on several projects which focus on new networking paradigm Software-defined Networking (SDN), Network Virtualiztion (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 l every aspects including entertainment, housekeeping, communication, healthcare, industry, and commute. Advancement in software development paradigms, enhancement of the comp networking infrastructure, and development of underlying philosophy in technology are appa enablers of such an evolution. This session focuses on generic Computer Science and ICT t thus aims to invite and select speakers who deliver their recent research work from academy industry.

Speakers

Automotive Software Architecture & Open Source Projects

Changhyeok Bae (MBition) 1

On scientific knowledge and approches to develop technologies

Jae Sook Cheong (Bayreuth University) 1

The Effect of Different Auditory Feedbacks on Interpersonal Coordination

Tonghun Hwang (Leibniz University Hannover) 1

[EI4] Innovative semiconductor devices and circuits, packaging and systems, and their scienti industrial applications.

Date & Time 2023-08-16 14:50

Room Hörsaal

Chair(s)

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

Dr. Jung Han Choi
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& Communication Research Center where he worked bio-health sensor, nano devices and RF/millimeter-w design including 60 GHz Si CMOS ICs. In 2011 he jo Fraunhofer Institute (Heinrich-Hertz Institute), Berlir and holds tenured position. Now he is working o power high data bit rate transmitter and receiver optical communications, microwave devices, elect simulations, and network analyzer measurement up t In 2003, he was awarded for the EEEfCOM (Ele Electronic Engineering for Communication) Innovation for the contribution to the development of the receiver circuit. He was also co-recipient of EuMIC F European Microwave Integrated Circuits Conference current research interests range from microwave act devices & IC, electromagnetic simulation & ana metamaterials. He holds 19 international registere pending patents in the area of semiconductor devi and systems for high-frequency engineering. He p 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 Eng Cardiff University, Wales, UK. His research interests wafer characterisation of active and passive sem devices, RF-IV waveform measurement and engineerin harmonic loadpull, high efficiency power amplifi microwave material characterization and sensing, v emphasis on interdisciplinary aspects of appl microwaves in tackling real-world challenges.

Synopsis

Rapid advances in semiconductor technologies, wide bandgap compound semiconductors s 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 possib before, for example, 5G/6G, Internet of Things (IoT), and high-speed lower-power data cente parallel to this, the unique properties of electromagnetic waves enable the use of RF and Mi technology as a platform for interdisciplinary research projects in tackling global challenges s 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 wireless and wired communications, but also aims to invite researchers from fundamental Sc industry involved in interdisciplinary research projects who work with RF and microwave tech

Speakers

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

Jong Mun Park (ams-OSRAM AG) 1

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

Youna Jang (Soonchunhyang University) 1

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

Dr. Junghan Choi (Fraunhofer Heinrich-Hertz Institute) 1

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

Dr. Juhoon Kim (Deutsche Telekom AG) 1

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

Dr. June Sik Kwak (RFHIC Inc.) 1

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

Minwho Lim (Fraunhofer IISB) 1

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

Juwan Kim (RF Materials Co.,Ltd.) 1

[EI5] 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

Dr Young Saeng Park is currently working as ar Professor at WMG, University of Warwick. He also Automation Systems group at WMG as a system ma also a research fellow for 12 years. He has significar and development for manafuacturing sector, including systems, virtual engineerin tool, virtual commisionging physical systems. He has not only led various development projects for automation systems, bu project expreience on vairous platforms and frame current interests are cyber physicla systems engineering, user expereince for manufacuring e machine learning for Internet of things, web technolog 3.0.

Synopsis

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

undergoing another change. Unlike Web 2.0, Web 3.0 aims to be a fully decentralized, trans
open, and secure environment where these infrastructure and applications will displace cent
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, metave
ubiquitous connectivity, etc. In particular, new types of values, services and applications hav
introduced based on blockchain which is the most important technology of decentralization,
non-fungible token (NFT), decentralised finance (DeFi), cryptocurrency (Crypto), decentralis
applications (dApp), distributed ledger technology (DLT), decentralised exchanges (DEX), de
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 b
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 syster
diversified preparation for it. In this session, we will explore not only technologies required fo
but also discuss in various environments considering legal, institutional, governmental aspec

Speakers

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

Youngseok Choi (Kingston University London) 1

Trilemma of Federated Learning: Privacy, Accuracy and Fairness

Kangsoo Jung (Inria) 1

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

Prof. Young Saeng Park (WMG, University of Warwick) 1

[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 Brair
Interfacing from Korea University, in 2018. From 2018
was associated to the Machine Learning Group at
Universität Berlin. Since 2020, Seul-Ki holds a positio
Researcher at Nota AI GmbH. His research intere
brain-computer interface, machine learning, a
compression.

Synopsis

Within the last decade, advances in Deep Learning, coupled with the large, freely available c
well as extremely high computing resources, have resulted in remarkable progress in the co
vision (CV), natural language processing (NLP), and broader artificial intelligence (AI) comm
Many academies and industries are also involved in developing/researching AI with Machine
accelerate scientific discovery and engineering design in diverse application domains (e.g. C
AlphaGo Zero, etc).
However, research in the AI field also shows that their performance on ranging from edge-de
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 a
significantly related to the studies about AI model efficiency and robustness, which we abstra
the Edge and Beyond AI".

In this reason, this workshop focuses on an emerging and impactful topic efficient artificial in
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 visior
on machine learning methods.
It will feature a host of invited talks covering a variety of topics in AI in CV through several dc
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) 1

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) 1

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