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ICTC 2018

THE 9TH INTERNATIONAL CONFERENCE ON ICT CONVERGENCE

Final Program

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Message from the Chairs

With great pleasure, we would like to welcome you to the 9th International Conference on Information and Communication Technology Convergence (ICTC 2018) being held in Jeju Island, Korea.

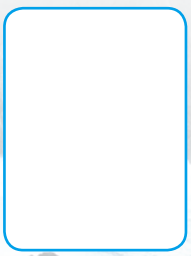
ICTC 2018 is one of the major international conferences in the area of Information and Communication Technology (ICT) Convergence organized by The Korean Institute of Communications and Information Sciences (KICS) with technical co-sponsorship of IEEE Communication Society and IEICE Communications Society, and patronized by leading ICT companies and organizations including ETRI, KOFST, Samsung Electronics, LG Electronics, HUAWEI, Ericsson-LG, SK Telecom, KT, POSCO ICT, GSI, NATIONAL INSTRUMENTS, Multi Screen Service Forum, Society Safety System Forum, Sensors, Jeju CVB, Jeju Special Self-Governing Province, and so on.

ICTC 2018 features an extremely rich program with the main theme of "ICT Convergence powered by smart intelligence." The attendees will have the opportunity to associate with the world's most distinguished industry leaders, researchers, government officials and academia professionals in the areas of future wireless communications and networking, smart media & convergence services, smart devices & consumer appliances, mobile cloud computing, green communications, healthcare and bio-informatics, and intelligent transportation technologies.

During ICTC 2018, keynote speeches and invited talks will be delivered by high level and prominent experts from Keio University, Samsung Electronics, National Institute of Telecommunications(Inatel), Georgia Institute of Technology, Neuroscience Research Institute, SK Telecom, Eurecom, ETRI, Huawei, NOKIA, Ericsson-LG, and so on. The technical program will also include presentations of invited and regular papers by diverse groups from all around the world on the topics of Advanced Wireless & Mobile Communication Systems, Internet of Things (IoT), u-Healthcare Systems & Bio-informatics, Smart Grid, Big Data, V2X, 5G, Artificial Intelligence and Machine Learning, Future Internet Technologies, Smart Media & Broadcasting and much towards the smarter ICT convergence technologies.

We cordially invite you to join us in Jeju Island from October 17th to 19th for this great ICT event and enjoy Jeju, known as the "Island of the Gods." We especially recommend you to visit and enjoy the natural World Heritage Site Jeju Volcanic Island and Lava Tubes.

We look forward to seeing you at ICTC 2018!



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OCTOBER 17TH (WEDNESDAY), 2018

Time	Crystal Hall 1	Crystal Hall 2	Jade Hall 1	Jade Hall 2	Amethyst Hall 1	Amethyst Hall 2	Sapphire Hall	Convention Hall-2
09:00-10:40 (100 min)	**Special Session I:** 5G Technology	**Session I-1:** Advanced Wireless & Mobile Communication Systems and Infrastructure 1	**Session I-2:** Big Data and Smart Computing 1	**Session I-3:** u-Healthcare Systems, and Bio-informatics & Its Applications	**Session I-4:** Information & Communication Theory, and Their Applications 1	**Session I-5:** Internet of Things (IoT), Internet of Everything (IoE), Web of Objects (WoO)	**Workshop I** Invited Paper Session	**Session P-1:** Poster Session 1
10:40-11:10	Coffee Break							
11:10-12:30 (80 min)	**Plenary Session I: Keynote Speeches and Opening Ceremony** (Convention Hall, 1st Floor) • Opening Address: Opening Address: Prof. Chung G. Kang, President of KICS • Congratulatory Address: Prof. Kohei Shiomoto, Representative of IEICE-CS • Keynote Speech 1: Prof. Tomoaki Ohtsuki, Keio University, Japan, "Smart Healthcare" • Keynote Speech 2: Dr. Kyungwhoon Cheun, Head of R&D, Networks Business, Samsung Electronics Co., Ltd, Korea, "5G : Transforming Lives and Industries"							
12:30-14:00	Lunch							
14:00-15:30 (90 min)	**Industrial Session I: AI and IoT in Industry 4.0** (Convention Hall, 1st Floor) • Invited Talk 1: Dr. Yu-Sung Chang, Senior Vice President, SK Telecom, Korea, "(Mis)Understanding Humans: Natural Language Understanding in ICT Industry" • Invited Talk 2: Mr. Soumya Kanti Datta, Research Engineer, Eurecom, France "Impact of IoT on Industry 4.0." • Invited Talk 3: Mr. O.K. Baek, Research Fellow/ former IBM Architect, ETRI, Korea, "Cognitive Thinking Machine (CybreBrain) to lead The 4th Industrial Revolution"							
15:30-16:00	Coffee Break							
16:00-17:40 (100 min)	**Special Session II:** Caching and computing for IoT and IoE networks	**Session II-1:** Systems, Services and Applications for ICT Convergence 1	**Session II-2:** Artificial Intelligence and Machine Learning 1	**Session II-3:** 5G, 4G, LTE, LTE-Advanced, WLAN, WPAN, WBAN 1	**Session II-4:** Information & Communication Theory, and Their Applications 2	**Workshop II-1** Internet Infrastructure	**Workshop II-2** Advances in ICT Education Workshop	**Workshop II-3** Human Interaction on Smart Mobility
18:00-19:00	**Welcome Reception** (Convention Hall, 1st Floor)							

OCTOBER 18TH (THURSDAY), 2018

Time	Crystal Hall 1	Crystal Hall 2	Jade Hall 1	Jade Hall 2	Amethyst Hall 1	Amethyst Hall 2	Sapphire Hall	Convention Hall-2
08:30-10:10 (100 min)	**Special Session III:** A.I. and Machine Learning	**Session III-1:** Advanced Wireless & Mobile Communication Systems and Infrastructure 2	**Session III-2:** 5G, 4G, LTE, LTE-Advanced, WLAN, WPAN, WBAN 2	**Session III-3:** Smart Cities and Indoor Positioning	**Session III-4:** SDN and Network Virtualization	**Workshop III-1** Advances in Convergence of ICT and Brain Science for better health Workshop 1	**Workshop III-2** Emerging Solutions for 5G and Beyond 5G Workshop 1	**Session P-2:** Poster Session 2
10:10-10:30	Coffee Break							
10:30-12:10 (100 min)	**Special Session IV:** 5G Systems and Services	**Session IV-1:** Signal and Image Processing 1	**Session IV-2:** Artificial Intelligence and Machine Learning 2	**Session IV-3:** Advanced Communication Networks and Future Internet Technologies 1	**Workshop IV-1** Wearable Technologies for Smart Applications	**Workshop IV-2** Advances in Convergence of ICT and Brain Science for better health Workshop 2	**Workshop IV-3** Emerging Solutions for 5G and Beyond 5G Workshop 2 (-16:30)	**Workshop IV-4** Intelligent Immersive Media Communications Workshop

Program at a Glance

OCTOBER 18TH (THURSDAY), 2018

Time	Crystal Hall 1	Crystal Hall 2	Jade Hall 1	Jade Hall 2	Amethyst Hall 1	Amethyst Hall 2	Sapphire Hall	Convention Hall-2
12:10-13:40	Lunch							
13:40-15:00 (80 min)	**Industrial Session II: 5G toward Industry 4.0** (Convention Hall, 1st Floor) • Invited Talk 4: Dr. Richard Lixiaojun, Head of Huawei 5G E2E Solution Department, Huawei Korea&Japan, China, "5G is Now, Together, Creating a Better Future" • Invited Talk 5: Dr. Bong Youl (Brian) Cho, Head of Radio Product Management for Asia Pacific and Japan, Mobile Networks, Nokia, Finland, "Nokia 5G Vision and Execution" • Invited Talk 6: Dr. Youngjoon Kim, Head of R&D, Ericsson-LG, Korea, "Turn on 5G and Accelerate IoT"							
15:00-15:30	Coffee Break							
15:30-17:40 (130 min)	**Plenary Session II: Keynote Speeches & ICT Express Best Paper Award Presentation** (Convention Hall, 1st Floor) • Keynote Speech 3: Prof. Zang-Hee Cho, Endowed Chair Professor & Director, Neuroscience Research Institute, Suwon University, Korea & Advanced Institutes of Convergence Technology, Seoul National University, Korea, "How Brain Science Can Help Artificial Intelligence or Information Technology" • Keynote Speech 4: Prof. Joel J.P.C. Rodrigues, National Institute of Telecommunications (Inatel), Brazil, "Trends and Challenges for Internet of Things" • Keynote Speech 5: Prof. Nikil Jayant, Emeritus Chaired Professor, Georgia Institute of Technology, USA. & Adjunct Professor, University of California at Santa Barbara, USA., "Quantifying Communications Quality: QoS, QoE and QoI" **ICT Express Best Paper Award Ceremony and Presentation** • Prof. Alex Casson, University of Manchester, UK, "Non-invasive Bioelectronics: Going beyond today's Wearables"							
18:30-20:30	**Banquet** (Convention Hall, 1st Floor) • TPC Report • Best Paper Award Announcement • Banquet Buffet (Seafood, Korea Traditional Dish, Japanese & Chinese Fusion, and More) with Chamber Music							

OCTOBER 19TH (FRIDAY), 2018

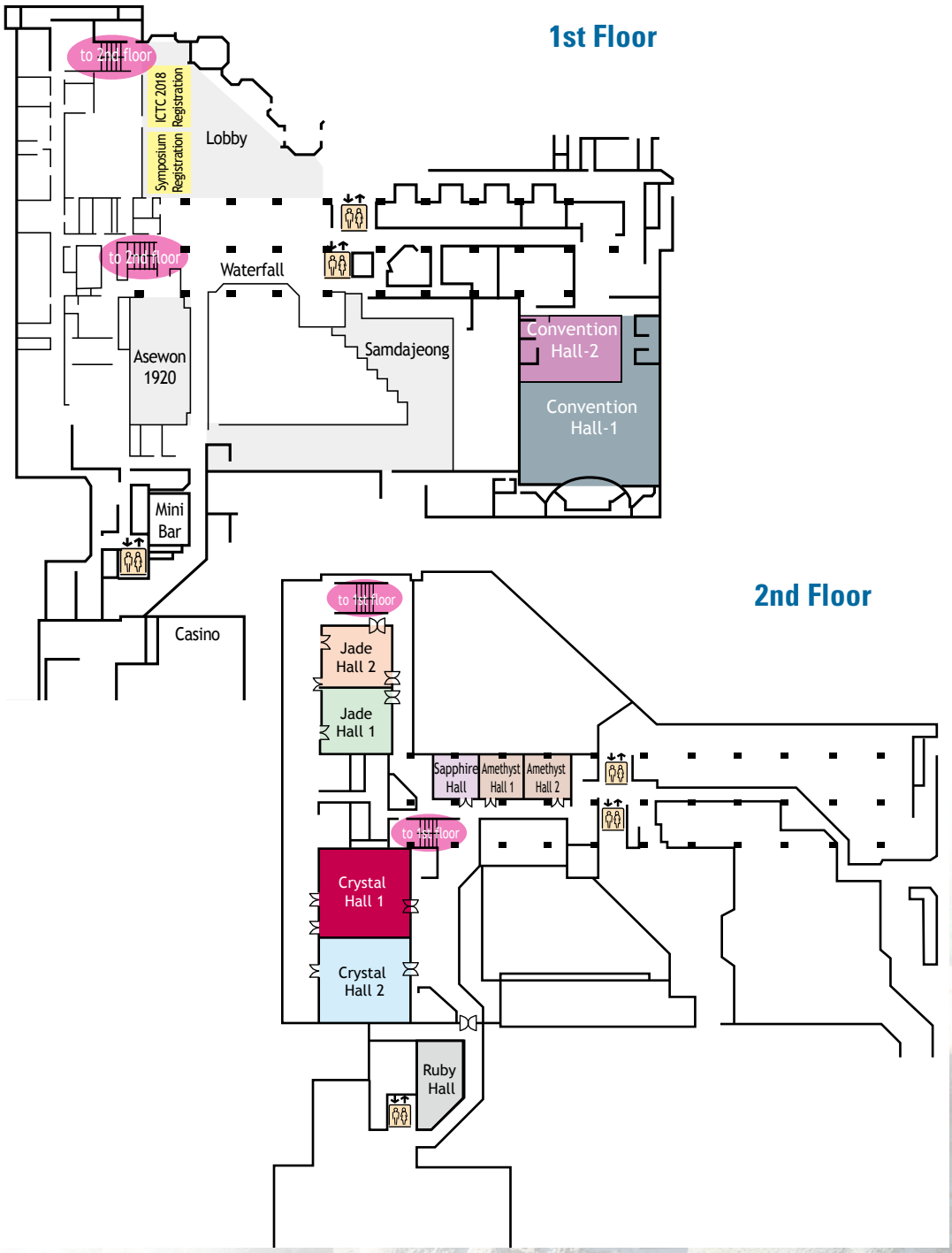
Time	Crystal Hall 1	Crystal Hall 2	Jade Hall 1	Jade Hall 2	Amethyst Hall 1	Amethyst Hall 2	Sapphire Hall	Convention Hall-2
08:30-10:10 (100min)	**Special Session V:** Innovations and Trends at Edges	**Session V-1:** Signal and Image Processing 2	**Session V-2:** Vehicular Information and Communication Technologies 2	**Session V-3:** Smart Cities	**Session V-4:** Advanced Communication Networks and Future Internet Technologies 2	**Session V-5:** Military and Defense Technologies	**Workshop V-1** IoE Data Workshop 1	**Workshop V-2** Quantum Information ITRC Track
10:10-10:30	Coffee Break							
10:30-12:10 (100min)	**Special Session VI:** Industrial IoT	**Session VI-1:** Systems, Services and Applications for ICT Convergence 2	**Session VI-2:** Big Data and Smart Computing 2	**Session VI-3:** Internet of 5G, 4G, LTE, LTE-Advanced, WLAN, WPAN, WBAN 3	**Session VI-4:** Information & Communication Theory, and Their Applications 3	**Session VI-5:** Encryption and Security for ICT Convergence	**Workshop VI-1** IoE Data Workshop 2	

Registration Hours

Oct. 17th (Wednesday) 07:50 - 18:00 | Oct. 18th (Thursday) 07:50 - 18:00 | Oct. 19st (Friday) 07:50 – 12:00

Session Room Locations

Maison Glad Jeju



Plenary Sessions

October 17 (Wednesday), 2018

Plenary Session I: Keynote Speeches and Opening Ceremony

11:10-12:30 | Convention Hall, 1st Floor

Time	Title	Invited Speakers
11:10-12:30	Opening Address	Prof. Chung G. Kang President of KICS
	Congratulatory Address	Prof. Kohei Shiomoto Representative of IEICE-CS
	Keynote Speech 1: "Smart Healthcare"	Prof. Tomoaki Ohtsuki Keio University, Japan
	Keynote Speech 2: "5G : Transforming Lives and Industries"	Dr. Kyungwhoon Cheun Head of R&D, Networks Business, Samsung Electronics Co., Ltd, Korea

Keynote Speech 1: "Smart Healthcare"

Prof. Tomoaki Ohtsuki, Keio University, Japan

Abstract:
With rapid aging society in developed countries particularly Japan, social costs for nursing care and medical expenses are also rising. Meanwhile, the size of the average family has continued to shrink,¡¡which results in the increase of elderly people living alone. Smart healthcare is expected to support the aging society where people can live healthy and peacefully, while reducing the costs for support dramatically. To realize such a society, smart technologies are necessary. Smart sensor is one of the smart technologies where it is expected to collect information about people and environments while keeping privacy. For instance, monitoring a person living alone is an important problem in which the use of cameras is not normally permitted or preferred. In this talk we will introduce smart healthcare and smart sensors that realize it. We will also introduce some of our developed smart sensors based on wireless communications technologies. Moreover, we will present some techniques to detect mental disease and conclude.

Biography:
Tomoaki Ohtsuki (Otsuki) is currently a Professor at Keio university, Japan. He received the B.E., M.E., and Ph. D. degrees in Electrical Engineering from Keio University, Yokohama, Japan in 1990, 1992, and 1994, respectively. From 1995 to 2005 he was with Science University of Tokyo. In 2005 he joined Keio University. He is engaged in research on wireless communications, optical communications, signal processing, and information theory. Dr. Ohtsuki is a recipient of the 1997 Inoue Research Award for Young Scientist, the 1997 Hiroshi Ando Memorial Young Engineering Award, Ericsson Young Scientist Award 2000, 2002 Funai Information and Science Award for Young Scientist, IEEE the 1st Asia-Pacific Young Researcher Award 2001, the 5th International Communication Foundation (ICF) Research Award, 2011 IEEE SPCE Outstanding Service Award, the 27th TELECOM System Technology Award, ETRI Journal's 2012 Best Reviewer Award, and 9th International Conference on Communications and Networking in China 2014 (CHINACOM '14) Best Paper Award. He has published more than 170 journal papers and 390 international conference papers. He served a Chair of IEEE Communications Society, Signal Processing for Communications and Electronics Technical Committee. He served a technical editor of the IEEE Wireless Communications Magazine and an editor of Elsevier Physical Communications. He is now serving an Area Editor of the IEEE Transactions on Vehicular Technology and an editor of the IEEE Communications Surveys and Tutorials. He has served general-co chair and symposium co-chair of many conferences, including IEEE GLOBECOM 2008, SPC, IEEE ICC2011, CTS, IEEE GCOM2012, SPC, IEEE SPAWC, and IEEE APWCS. He gave tutorials and keynote speech at many international conferences including IEEE VTC, IEEE PIMRC, and so on. He was a Vice President of Communications Society of the IEICE, Japan and is the President-Elect of Communications Society of the IEICE, Japan. He is a fellow of the IEICE and a senior member of the IEEE.

Plenary Sessions

Keynote Speech 2: "5G is reality – Transforming Lives and Industries"

Dr. Kyungwhoon Cheun, Head of R&D, Networks Business, Samsung Electronics Co., Ltd, Korea

Abstract:
With the ever-increasing demands on mobile data traffic, stronger requirements on latency and reliability of novel mobile services, it becomes more challenging to meet those diverse needs by sheer migration of the existing cellular technologies. Innovative and pioneering technologies are now being used in the most advanced 5G trials yet and are helping to lay the foundation of critical 5G standards. Through research partnerships spanning the industry value chain, the viability of some of practical use cases is now demonstrated including fixed wireless access. The industry is now in need of productive ecosystem spanning the entire value chain that is capable of delivering on the promises of 5G. Samsung is actively working to make that a reality, in order to kick start tangible 5G applications.

Biography:
Kyungwhoon Cheun received his B.S. degree in Electronics Engineering from Seoul National University in 1985. He earned his M.S. and Ph.D. degrees from the University of Michigan, Ann Arbor in 1987 and 1989, respectively.
He served as a professor at the University of Delaware from 1989 to 1991 and then at the Pohang University of Science and Technology (POSTECH) from 1991 to 2014. While at POSTECH, he headed the national ITRC center for Broadband OFDM Multiple Access (BrOMA), an eight-year research program supported by the Korean Ministry of Knowledge and Economy.
Aside from his academic achievements, he, as an engineering consultant, has contributed to many break-through innovations in diverse industry areas of wireless communications and audio signal processing. He was on leave at Witechs and NSystems in San Diego where he developed efficient receiver algorithms for WLANs and WCDMA. From 2004 to 2011, he served as the Chief Technical Officer (CTO) of Pulsus Technologies Inc., taking the lead of developing sound processing algorithms and sigma-delta modulation based full digital audio amplifier SoCs.
Since 2012, he has been with Samsung Electronics leading research and development for next generation cellular and Wi-Fi networks. Currently he is an Executive Vice President and head of R&D in Network Business, Samsung Electronics.

Plenary Sessions

October 18th (Thursday), 2018

Plenary Session II: Keynote Speeches & ICT Express Best Paper Award Presentation

15:30-17:40 | Convention Hall, 1st Floor

Time	Title	Invited Speakers
15:30-17:40	Keynote Speech 3: "How Brain Science Can Help Artificial Intelligence or Information Technology"	Prof. Zang-Hee Cho Endowed Chair Professor & Director, Neuroscience Research Institute, Suwon University, Korea & Advanced Institutes of Convergence Technology, Seoul National University, Korea
	Keynote Speech 4: "Trends and Challenges for Internet of Things"	Prof. Joel J.P.C. Rodrigues National Institute of Telecommunications (Inatel), Brazil
	Keynote Speech 5: "Quantifying Communications Quality: QoS, QoE and QoI"	Prof. Nikil Jayant Emeritus Chaired Professor, Georgia Institute of Technology, USA. & Adjunct Professor, University of California at Santa Barbara, USA
	ICT Express Best Paper Award Ceremony and Presentation: "Non-invasive Bioelectronics: Going beyond today's Wearables"	Prof. Alex Casson University of Manchester, UK,

Keynote Speech 3: "How Brain Science Can Help Artificial Intelligence or Information Technology"

Prof. Zang-Hee Cho, Endowed Chair Professor & Director, Neuroscience Research Institute, Suwon University, Korea & Advanced Institutes of Convergence Technology, Seoul National University, Korea

Abstract:
One of the least known science in modern scientific history is the Brain science, especially the human intelligence and Cognition. Our understanding of cognitive science domain differs widely from different disciplines, from psychiatry to psychology, neuroscience to cognitive science, and modern computer science to artificial intelligence.
I will go over, at least with known scientific bases of current neuroscience, how our brain works for memory, language, and cognition.

Biography:
Prof. Zang-Hee Cho received Ph.D. from Uppsala University (Sweden) in 1966 and has been faculty at the University of Stockholm and University of California-Los Angeles. In 1979, Dr. Cho moved to Columbia University as a Professor of Radiology (Physics). Since 1985, Dr. Cho was the Professor of Radiological Science as well as professor of Psychiatry and Human Behavior at University of California at Irvine. From 2005, Prof. Cho served as University Professor and Director of the Neuroscience Research Institute, Gachon University of Medicine & Science, Incheon, till he joined as a Distinguished Research Fellow at the Advanced Institute of Convergence Technology (AICT), Seoul National University, Seoul, Korea. Since 2017, Professor Cho is concurrently serving as a director of Neuroscience Research Institute, Suwon University, Suwon, Korea.
Professor Cho has been a pioneer in Positron Emission Tomography (PET) and Magnetic Resonance Imaging since the inception of the computerized tomography (CT) in 1972. He was the first one who pioneered world's first ¡°Ring PET¡±, the first molecular imaging device, in 1975. Professor Cho has also been pioneer in the field of MRI. Since 1980 he developed one of the world's first 0.1T MRI in Korea and subsequently 2.0T in 1985. He then continued one of the world's first 7.0T MRI coupling with super resolution PET (HRRT) for the world's first PET-MRI fusion system in 2008. Among the many honors and awards, Professor Cho was elected as a member of US National Academy of Science, institute of medicine in 1997 (Now US National Academy of Medicine).

Plenary Sessions

Keynote Speech 4: "Trends and Challenges for Internet of Things"

Prof. Joel J.P.C. Rodrigues, National Institute of Telecommunications (Inatel), Brazil

Abstract:
This keynote addresses a hot and updated topic focusing on Internet of Things (IoT), considering their most relevant trends and challenges for Internet of Things. It starts with an introduction to IoT and its typical application scenarios considering different verticals. Relevant aspects considering opportunities for IoT will be addressed, considering promising verticals. The Inatel Smart Campus, an open Campus for research on IoT, experiments, and concepts and technology validation will be presented. It is a project open for companies' participation and promotes the academy-enterprise interaction. It is a true living lab for several IoT verticals, including smart cities and smart homes. An initiative to prepare ICT professionals for new challenges regarding this new generation technologies for IoT will be presented. The communication ends with new trends and issues on Internet of Things, suggesting further research topics.

Biography:
Joel J.P.C. Rodrigues [S'01, M'06, SM'06] is a professor at the National Institute of Telecommunications (Inatel), Brazil and senior researcher at the Instituto de Telecomunicações, Portugal. Prof. Rodrigues is the leader of the Internet of Things research group (CNPq), Director for Conference Development – IEEE ComSoc Board of Governors, IEEE Distinguished Lecturer, Technical Activities Committee Chair of the IEEE ComSoc Latin America Region Board, the President of the scientific council at ParkUrbis – Covilhã Science and Technology Park, the Past-Chair of the IEEE ComSoc Technical Committee on eHealth, the Past-chair of the IEEE ComSoc Technical Committee on Communications Software, Steering Committee member of the IEEE Life Sciences Technical Community and Publications co-Chair, and Member Representative of the IEEE Communications Society on the IEEE Biometrics Council. He is the editor-in-chief of the International Journal on E-Health and Medical Communications, the editor-in-chief of the Recent Advances on Communications and Networking Technology, the editor-in-chief of the Journal of Multimedia Information Systems, and editorial board member of several high-reputed journals. He has been general chair and TPC Chair of many international conferences, including IEEE ICC, IEEE GLOBECOM, IEEE HEALTHCOM, and IEEE LatinCom. He has authored or coauthored over 600 papers in refereed international journals and conferences, 3 books, and 2 patents. He had been awarded several Outstanding Leadership and Outstanding Service Awards by IEEE Communications Society and several best papers awards. Prof. Rodrigues is a licensed professional engineer (as senior member), member of the Internet Society, and a senior member ACM and IEEE.

Keynote Speech 5: "Quantifying Communications Quality: QoS, QoE and QoI"

Prof. Nikil Jayant, Emeritus Chaired Professor, Georgia Institute of Technology, USA. & Adjunct Professor, University of California at Santa Barbara, USA

Abstract:
In our technology, terms such as bandwidth, bit rate and latency, computing speed, storage and memory, number of connections in the Internet of Things, and the volume and velocity of so-called big data, are all described with exponentially increasing numbers, year after year. It is in this context that we step back and ask a question that recognizes the value of quantity, but re-visits the importance of measuring and assuring quality.
In this talk, I discuss communications quality in terms of three related dimensions: QoS, QoE and QoI. The concept of Quality of Service (QoS) was developed to calibrate the level of service available to a user in data communications, and continues to be critical in today's packet-based all-media networks. In the parallel field of digital signal processing and compression, objective metrics such as signal to noise ratio were developed, along with scholarly ways of refining them to reflect the subjective Quality of Experience (QoE), particularly in audiovisual communications. Still, there are challenging aspects such as QoE in immersive environments, which is at best in the research stage. Concurrently, we are increasingly faced with hard classes of communications problems where there is a need to process complex information events and trails, to engage humans and computers in algorithms for collective intelligence, and to make a much touted transition from big data to knowledge. It is imperative in this context to consider a contemporary formulation of a third metric, the Quality of Information (QoI), one that reflects contextual dimensions of timeliness, relevance, completeness and novelty, while also reflecting an end-to-end system metric. Quantifying such a measure is not easy, and in fact that term may not

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even appear readily in google searches involving terms such as Big Data or IoT. But advances in that direction, even if empirical, are central to the next generation of information science and architecture.
My talk today takes us through the chronology of the QoS-QoE-QoI story, using case studies from entertainment, healthcare and scientific discovery, to contrast and connect practice and theory in the subject of quality measurement and assurance.

Biography:
Dr. Nikil Jayant is Emeritus Chaired Professor at Georgia Institute of Technology where he served as a Georgia Research Alliance Eminent Scholar and as the Executive Director of the Georgia Centers for Advanced Telecommunication Technology. He is currently an Adjunct Professor with the University of California at Santa Barbara.
Prior to his nearly 20-year career in academia, he worked at Bell Laboratories for 30 years, as an individual researcher in the Acoustics Research Department and as the founding director of three research organizations in the areas of audiovisual signal processing and digital communications. Contributions from these organizations are reflected in international ITU and ISO-MPEG standards for speech and multimedia communications, and in US standards for Cellular Telephony, HDTV and Digital Audio Radio. At Georgia Tech, he introduced a graduate course on Multimedia Communications, advised ten PhD students in the area, and led a multi-campus research program on gigabit wireless. He also co-founded two video communications companies for advancing elastic compression and automatic quality assessment. His research at Georgia Tech included a partnership with Emory University, Georgia State University and the Medical College of Georgia in the areas of telehealth, digital pathology and informatics. More recently, his research focus at UCSB is on an information-rigorous architecture for collective human-computer intelligence.
Dr. Jayant is the author of 180 papers, 45 patents and 5 books. He is the winner of two IEEE prize paper awards, the Lucent patent recognition award, and a recipient of the IEEE Third Millennium medal. He has been inducted into the New Jersey Inventors Hall of Fame and named a Distinguished Alumnus of the Indian Institute of Science. He is a Fellow of the IEEE and a member of the US National Academy of Engineering. As a member of the NAE, Dr. Jayant served as the Chair of a National Academies study that resulted in a policy-influencing report by the National Research Council, Broadband: Bringing Home the Bits.

KICT Express Best Paper Award Ceremony and Presentation: "Non-invasive Bioelectronics: Going beyond today's Wearables"

Prof. Alex Casson, University of Manchester, UK,

Biography:
Dr Alex Casson is a Reader (Associate Professor) in the Materials, Devices and Systems division of the school of Electrical and Electronic Engineering at the University of Manchester. His research focuses on non-invasive bioelectronics interfaces: the design and application of wearable sensors, and 'conformal sensors', for human body monitoring and data analysis from highly artefact prone naturalistic situations. This work is highly multi-disciplinary and he has research expertise in:
• Ultra low power microelectronic circuit design (at the discrete and fully custom microchip levels).
• Sensor signal processing for power constrained motion artefact rich environments.
• Personalised device manufacture using 3D printing and inkjet printing.
He has particular interests in precision devices for closed loop bioelectronic interventions: those which are tailored to the individual by personalised manufacturing via printing; and tailored interventions by adjusting treatments using data driven responses/outputs from real-time signal processing. Dr Casson's ultra low power sensors work is mainly for medical applications, with a strong background in EEG and transcranial current stimulation. These applications focus on both mental health situations including epilepsy, sleep disorders, stroke, Parkinson's disease and autism, and physical health/rehabilitation applications including diabetic foot ulceration.
Dr Casson gained his undergraduate degree from the University of Oxford in 2006 where he read Engineering Science specialising in Electronic Engineering (MEng). He completed his PhD from Imperial College London in 2010, winning the prize for best doctoral thesis in electrical and electronic engineering. Dr Casson worked as a research associate and research fellow at Imperial College until 2013 when he joined the faculty at the University of Manchester. He is good clinical practice certified and is a site miner for the Manchester Integrating Medicine and Innovative Technology (MIMIT) scheme for systematically connecting clinicians and engineers to address unmet clinical needs. Dr Casson is currently a Senior Member of the IEEE, Fellow of the Higher Education Academy, and vice-chair of the Institution of Engineering and Technology's healthcare technologies network.

Industrial Sessions

October 17th (Wednesday), 2018

Industrial Session I: AI and IoT in Industry 4.0

14:00-15:30 | Convention Hall, 1st Floor

Time	Title	Invited Speakers
14:00-15:30	Invited Talk 1: "(Mis)Understanding Humans: Natural Language Understanding in ICT Industry"	Dr. Yu-Sung Chang Senior Vice President, SK Telecom, Korea
	Invited Talk 2: "Impact of IoT on Industry 4.0."	Mr. Soumya Kanti Datta Research Engineer, Eurecom, France
	Invited Talk 3: "Cognitive Thinking Machine (CybreBrain) to lead The 4th Industrial Revolution"	Mr. O.K. Baek Research Fellow/ former IBM Architect, ETRI, Korea,

Invited Talk 1: "(Mis)Understanding Humans: Natural Language Understanding in ICT Industry"

Dr. Yu-Sung Chang, Senior Vice President, SK Telecom, Korea

Abstract:
Alexa and Siri are now household names and the word chatbot is becoming a synonym to Artificial Intelligence. Many ICT companies are rushing towards this seeming goldmine, yet poor understanding on the technology and mismanagement often result in undesirable customer experience, and rarely lead to huge success.
In this talk, we will cover a brief history of Natural Language Understanding and present practical applications of the current NLU technology in the ICT industry. We will discuss advances in NLU technologies and potential future directions, especially with respect to 5G hyper connectivity and decentralized computing in mobile network industry.

Biography:

Yu-Sung Chang is Senior Vice President of Technology Prototyping Group for SK Telecom AI Research Center. He has been focusing on data-driven strategy and service development for over 20 years. He started his career at Wolfram Research—the makers of Mathematica and Wolfram Alpha which powers mobile personal assistants including Siri and Bixby—where he held various positions including Chief Product Officer. He worked for Samsung Mobile between 2013 and 2015 where he led advanced UX group and spearheaded the launch of Samsung Digital Health Platform. He has been engaging with several NLP startups as tech advisor and recently cofounded Huma AI, a natural language-driven healthcare automation company. His topics of interest includes natural language understanding, advanced computer vision and machine decision making for embedded systems. He holds MS in Mathematics from New York University and PhD in CS from SUNY at Stony Brook.

Invited Talk 2: "Impact of IoT on Industry 4.0."

Mr. Soumya Kanti Datta, Research Engineer, Eurecom, France

Biography:

Soumya Kanti Datta is a research engineer in EURECOM, France since 2012 and is working on French national, EIT Digital and EU H2020 research projects. His research focuses on innovation, standardization and development of next-generation technologies in IoT, WoT, and CyberSecurity. He has published 70+ research papers and articles in top ACM and IEEE Conferences, Magazines and Journals. His research paper has been cited more than 1100 times in peer reviewed conference and Journal papers. Soumya is a member of IEEE, IEEE Communications Society and IEEE Consumer Electronics (CE) Society. He leads the activities of IEEE CE Society Future Directions Team on IoT and is an Associate Editor in IEEE Consumer Electronics Magazine. He has also served several IEEE Conferences and Workshops in many capacities. He has also

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received awards from IEEE TenSymp 2018, IEEE ISCE 2017, and IEEE GCCE 2015 for his research papers. He has delivered Keynote Speeches in several international conferences and technical workshops. He is also actively involved in W3C Web of Things Working Group and contributing to its standard development activities. He obtained an M.Sc in Communications and Computer Security from Telecom ParisTech (EURECOM), France.

Invited Talk 3: "Cognitive Thinking Machine (CybreBrain) to lead The 4th Industrial Revolution"

Mr. O.K. Baek, Research Fellow/ former IBM Architect, ETRI, Korea,

Abstract:

The primary theme of the Cognitive Informatics Research and Development Program at the Electronics and Telecommunications Research Institutes of Korea(ETRI) is for development of a self-adaptive artificial intelligence with the capabilities of deductive reasoning, real time inferencing from in-motion data as well as at-rest data, progressive and incremental learning from outcomes, and self-adaptation to new findings and decision making.

Key constrains and shortcomings inherent in today's machine learning and artificial intelligent technologies include: (1) very large amount of accumulated data are required for building and training a learning model; (2) laborious, timeconsuming and costly manual processes are involved for preprocessing of training data; (3) learning is based on trial-and-error approach and yet with "catastrophic forgetting"; (4) any slight changes of training data lead to building a brand new learning model from scratch; (5) the learning model is opaque and unexplainable; and (6) the results are unexplainable and therefore not debuggable.

In order to address the constrains and shortcomings inherent in today's artificial intelligent technologies, we have been developing an advanced AI technologies, which are referred to as Cognitive Thinking Machine or "CybreBrain".

The key functional properties of CybreBrain include: (1) autonomous learning as a human-out-of-loop system; (2) inferencing and prediction from small sets of in-motion data; (3) outcome-driven incremental learning; (4) self-adaptation to the unanticipated and uncertainties; (5) adaptive and debuggable learning model; and (6) explainable results with high level of confidence. CybreBrain learns itself incrementally and self-adapts to unanticipated exceptions or changes and helps us respond to the unanticipated and manage un.

Biography:

O.K. Baek is the Research Fellow & Head of Cognitive Informatics Resear c h and Development at the Elec t roni c s and Telecommunications Research Institute (ETRI). He is leading the strategic R&D initiative at ETRI to enable The 4th Industrial Revolution, with focus on the Cognitive Artificial Intelligence.

This cognitive artificial intelligence with plasticity is capable of deductive reasoning, real time inferencing from in-motion data as well as at-rest data, progressive and incremental learning from outcomes, and self-adaptation to new findings and decision making.

Prior to joining ETRI in September 2017, he had worked as the Global Solutions Executive & Executive Architect at IBM, specialized in advanced systems and emerging industry solutions.

He focused on Artificial Intelligence and Cognitive Analytics as well as IT strategy, ecosystem architecture, end-to-end solution design and technical governance.

He has over 40 years of extensive experience in research & development and delivery of enterprise architectures and end-toend solution design of complex enterprise solutions involving multiple business domains and advanced technologies.

He has published two books through John & Wiley Publishing Company, authored over 50 technical papers and filed over 15 international patent applications related to cognitive computing, machine learning and artificial intelligence, distributed and parallel processing, advanced analytics, IT security and privacy, and biomedical informatics.

Industrial Sessions

October 18th (Thursday), 2018

Industrial Session II: 5G toward Industry 4.0

13:40-15:00 | Convention Hall, 1st Floor

Time	Title	Invited Speakers
13:40-15:00	Invited Talk 4: "5G is Now, Together, Creating a Better Future"	Dr. Richard Lixiaojun Head of Huawei 5G E2E Solution Department, Huawei Korea&Japan, China
	Invited Talk 5: "Nokia 5G Vision and Execution"	Dr. Bong Youl (Brian) Cho Head of Radio Product Management for Asia Pacific and Japan, Mobile Networks, Nokia, Finland
	Invited Talk 6: "Turn on 5G and Accelerate IoT"	Dr. Youngjoon Kim Head of R&D, Ericsson-LG, Korea

Invited Talk 4: "5G is Now, Together, Creating a Better Future"

Dr. Richard Lixiaojun, Head of Huawei 5G E2E Solution Department, Huawei Korea&Japan, China

Abstract:
With 3GPP R15 Frozen on June 15, 2018, 5G has achieved an important milestone. Major countries have announced 5G commercial plan, among them, Korea is most aggressive and all operators will launch 5G service by middle of 2019. As a global ICT infrastructure vender, Huawei is going to work with the industry to deliver 5G mission, will deliver 5G NSA E2E commercial systems by Q3 2018 and SA E2E commercial systems by Q1 2019. During my talk, I will introduce Huawei E2E 5G products and solution, and 5G cooperation with international organizations and operators around the world, include 5G network verification and potential 5G use cases.

Biography:
Academic Background
– Zhejiang University EE (BS)
– Zhejiang University EE (PhD.)
Career
– 2017 ~ Present Huawei Korea & Japan, Head of 5G Integrated Solution Department
– 2016~2017 Huawei Wireless Product Line, Head of 5G Solution Department
– 2013~2016 Huawei & Vodafone, Head of Vodafone Wireless Joint Innovation Center
– 2008 ~ 2013 Huawei Wireless Product Line, Head of LTE Development Department
– 2005 ~ 2008 Huawei Wireless Product Line, System & Software Engineer

Invited Talk 5: "Nokia 5G Vision and Execution"

Dr. Bong Youl (Brian) Cho, Head of Radio Product Management for Asia Pacific and Japan, Mobile Networks, Nokia, Finland

Biography:
Bong Youl (Brian) Cho is currently working for Nokia as a head of radio product management for Asia Pacific and Japan in Nokia Mobile Networks (MN) business group. In this role he is responsible for driving Nokia radio product competitiveness to provide the best-in-class 5G NR (new radio), 4G LTE, SRAN (single RAN), and other products to customers in this market. At the same time, he and his team are having various technology discussions & collaboration between Nokia and customers/industry about 5G, IoT, Cloud, network evolution, and DSP (Digital Service Provider), etc.
Before joining Nokia, he firstly joined radio research division at KTF (a wireless operator in

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Korea) in 1999, mainly working on the PHY/MAC layer topics of IS-95 A/B and 3GPP WCDMA. In 2001, he joined wireless communications modem development team at GCT Semiconductor, and developed various kinds of wireless communications modem including 3GPP Release 99 WCDMA PHY/MAC modem, Bluetooth, IEEE 802.11a/b/g Wireless LAN, DMB (Digital Multimedia Broadcasting), etc. From 2005 to 2010, he handles various technical topics around mobile broadband technologies ranging from standardization and regulatory/policy to products and network engineering in Asia Pacific region at Intel Corporation.
He holds the B.S. degree and the M.S. degree of electrical engineering, both from Seoul National University, South Korea, and holds the Ph. D degree of electrical engineering from Kwangwoon University, South Korea. His Master thesis is about CDMA interference cancellation and Ph. D thesis is about OFDM(A) and MIMO. He also holds the B.S. degree of business administration from Korea National Open University, South Korea.
He holds several US patents and Korean domestic patents on wireless communications. He also wrote a few books in Korean such as "3G/4G Mobile Communication Systems", and translated several books to Korean including a well known book written by Harri Holma and Antti Toskala.

Invited Talk 6: "Turn on 5G and Accelerate IoT"

Dr. Youngjoon Kim, Head of R&D, Ericsson-LG, Korea

Abstract:
Throughout global collaborative efforts from telecommunication industry, 5G standardization has been achieved for phase 1 non-stand-alone operation and targeting to complete stand-alone operation with full service category enhanced mobile broadband, mission critical IoT and massive IoT in 2019. This talk discusses the 5G product and solution readiness along with standardization. It also how 5G accelerate IoT in various industries.

Biography:
Youngjoon Kim is a currently Senior Vice President and Head of R&D Ericsson-LG and he is a member of Ericsson R&D North East Asia leadership.
Before joining Ericsson-LG, He held the position as Head of R&D LG-Nortel from 2008. Youngjoon held the position as Director in System Architecture Research Lab, LG-Electronics Korea from 2005 to 2007. He was named Vice President in 2002 and responsible for Mobile Communication Research Division, LG-Electronics Korea.
From 2000 to 2010, as a Korea ICT R&D leader, he led several mobile data technology development projects of Alcatel-Lucent, Nortel, Qualcomm, LG-Electronics and Korea Government. Since joining LG Group in 1986, He has also held various managerial positions in Korea.
He is currently one of the cooperate vice-president of KICS (The Korean Institute of Communications and Information Sciences) and actively participated in many major Korean ICT Industry Fora.
He received his B.S and M.S degrees in Electronic Communication from Hanyang University, Seoul and the Ph.D. degree in Computer Science from Korea University.

Special Sessions

October 17th (Wednesday), 2018

Special Session I: 5G Technology

09:00-10:40 | Crystal Hall 1

Chair: Dr. Junhwan lee (ETRI, Korea)

Session	Title	Invited Speakers
09:00-10:40	PoCs and Challenges of Moving Wireless Backhaul for 5G and Beyond	Dr. Hyunkyu Jeong Research Fellow Electronics and Telecommunications Research Institute(ETRI), Korea
	Wireless Evolution Towards 5G	Prof. Fumiyuki Adachi Tohoku University, Japan
	5G and the Factories of the Future	Prof. Klaus Moessner 5G Innovation Centre (5GIC), United Kingdom

Invited Talk 1: "PoCs and Challenges of Moving Wireless Backhaul for 5G and Beyond"

Dr. Hyunkyu Jeong, Research Fellow, Electronics and Telecommunications Research Institute(ETRI), Korea

Abstract:
5G is expected to provide high traffic capacity compared to 4G in mobile communication. Among enabling technologies for more capacity, new spectrum utilization would be one of prominent choices for this goal, but still challenging for radio applications. Regarding utilization of millimeter wave band (mmWave), it has been traditionally used in WPAN and WLAN, as well as fixed wireless connectivity in mobile network such as point to point backhaul application. Furthermore, mmWave application to "access link"in hotspot cellular network, which provides enhanced broadband connectivity in small zone area, looks feasible based on world-wide research and trial activities for recent 5G system development. In this talk, as a new attempt for mmWave utilization, application to moving backhaul (or mobile wireless backhaul) will be given. Requirements with motivation and various use cases will be observed. As PoC (Proof of Concept) and trial cases, MHN(Mobile Hotspot Network) for moving train application will be introduced, of which technologies were proven in field verification for Seoul Metro Line #8. In addition, other trial for moving bus application will be presented, which was demonstrated at the site of 2018 PyeongChang Winter Olympic as the outcome of Korea-EU collaboration joint research project. Finally challenging Issues for further research are summarized.

Biography:
Dr. Hyun Kyu Chung is a research fellow and vice president of ETRI(Electronics and Telecommunications Research Institute). He was head of 5G Giga-Service Research Laboratory, which was responsible for mobile communication R&D for the Giga-Korea Project in ETRI. He received B.S. degree from Seoul National University in 1985 and his master degree on electrical engineering from KAIST in 1988. He joined to Korea Telecom in 1988 as a researcher. After moving his career to SK Telecom in 1993, he had served as a researcher for deploying world-first CDMA commercial networks and head of SK Telecom U.S. R&D Center at Fairfield, New Jersey. In U.S. he pursued Ph.D. degree in electrical engineering in Polytechnic Institute of NYU, Brooklyn, New York, where he majored wave propagation for mobile communications. After his doctoral degree in 2000, he joined to Lucent Technologies in New Jersey as a member of technical staff, before joining to ETRI in 2001. His research interests are wireless technologies for mobile communication.

Invited Talk 2: "Wireless Evolution Towards 5G"

Prof. Fumiyuki Adachi, Tohoku University, Japan

Abstract:
Mobile communications network has now evolved into the 4th generation (4G). An increasing popularity of broadband services demands

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a significant improvement in the spectrum efficiency and energy efficiency. Recently, the research and development of 5G mobile communications have been intensified. One promising approach is an adoption of the distributed MIMO radio access network (RAN). After briefly overviewing the evolution of mobile communications network, we will introduce the recent advances in distributed MIMO RAN. A number of distributed antennas are deployed over a traditional macro-cell area covered by a macro-cell base station. They are connected to the MBS by the optical mobile fronthaul. Distributed MIMO RAN exploits the spatial distribution of both antennas and users. Some of distributed antennas near a user terminal are selected to perform distributed MIMO cooperative transmission, which includes single-user MIMO diversity, multi-user MIMO multiplexing, and peak-to-average power ratio (PAPR) suppression of transmit signals. In the distributed MIMO RAN, adjacent macro-cells are loosely connected, and hence, the inter-cell interference (ICI) problem will be produced. A new frequency band, e.g. the mm wave band, where abundant bandwidth remains unused, will be utilized. Therefore, there will be a high Doppler shift problem. In this talk, we will also present adaptive channel estimation and adaptive ICI coordination (ICIC).

Biography:

Fumiyuki Adachi received the B.S. and Dr. Eng. degrees in electrical engineering from Tohoku University, Sendai, Japan, in 1973 and 1984, respectively. In April 1973, he joined the Electrical Communications Laboratories of Nippon Telegraph & Telephone Corporation (now NTT) and conducted various researches on digital cellular mobile communications. From July 1992 to December 1999, he was with NTT Mobile Communications Network, Inc. (now NTT DoCoMo, Inc.), where he led a research group on Wideband CDMA for 3G systems. Since January 2000, he has been with Tohoku University, Sendai, Japan. His research interests are in the area of wireless signal processing (multi-access, equalization, antenna diversity, adaptive transmission, channel coding, etc.) and networking. He is an IEEE Life Fellow and an IEICE Fellow. He was a recipient of the IEEE Vehicular Technology Society Avant Garde Award 2000, IEICE Achievement Award 2002, Thomson Scientific Research Front Award 2004, Ericsson Telecommunications Award 2008, Prime Minister Invention Award 2010, KDDI Foundation Excellent Research Award 2012, C&C Prize 2014, IEEE VTS Stuart Meyer Memorial Award 2017, and IEEE ComSoc RCC Technical Recognition Award 2017. He is listed in Highly Cited Researchers 2001 (https://clarivate.com/hcr/researchers-list/archived-lists/).

Invited Talk 3: "5G and the Factories of the Future"

Prof. Klaus Moessner, 5G Innovation Centre (5GIC), United Kingdom

Abstract:

Future mobile and fixed networks will look very different from the current networks and they will support a vastly different range of services and applications. They will take the role of a common critical backbone of the various infrastructures we are currently used to. Beyond having to provide the bit-pipes and connectivity for classical communication and high resolution entertainment services, these networks will also form the backbone for services that use at current legacy and private networks. Telemetry, smart electricity and smart water supplies will rely on and share the same infrastructure as content services. These future networks will be replacing legacy and hitherto customised networks, and they will be fully virtualised. Domains like manufacturing will have their own network slices providing the KPIs (eg delay, reliability, throughput) that are needed in the particular factory. This will change the way factories of the future are organised and structured.

This speech will discuss the requirements of factories of the future (FoF) raise towards the underlying communication networks. It will look into the technical details and aspects that 5G (and beyond) networks will need to implement to meet the FoF requirements. Finally it will present the approach taken in the Clear5G project to define extensions necessary to ensure that 5G networks are able to fully support the vision of the FoF.

Biography:

Klaus Moessner is Professor in Cognitive Networks in the 5G Innovation Centre (5GIC). He has been actively involved in the various European Community funded research frameworks (from FP 5 onwards). He has also had involvement in some 20+ other EU funded projects, has been technical manager and project manager, has led the FP7 project SocIoTal and is currently leading the H2020 EU-Japan project iKaaS, the 5G PPP project Speed5G, and since September 2017 the EU-Taiwan project Clear5G.Klaus' research interests are around the aspects of resource management in wireless communication systems, reconfigurability on the different system levels, including reconfiguration management and scheduling in wireless networks as well as network supported adaptability of multimodal user interfaces. He was founding chair of the IEEE DySPAN working group 6 on Spectrum

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Sensing Interfaces.He is actively involved in the investigation and teaching of mobile service provision (including IoT deployments and services). His research includes the area of resource efficiency and on mechanisms for dynamic resource allocation. And he is contributing to the work on System Architecture and Co-existence aspects in the 5GIC, covering aspects including dynamic spectrum sharing/access, self-organisation of the radio access and the regulatory implications of DSA and Cognitive Radio Networks. Since July 2017 Klaus is a member of the Board of Trustees of the Fraunhofer Institute for Open Communication Systems FOKUS, in Berlin, Germany, and since January 2018 he is a member of the Scientific Committee of the Shift2Rail Joint Undertaking.

October 17th (Wednesday), 2018

Special Session II: Caching and computing for IoT and IoE networks

16:00-17:40 | Crystal Hall 1

Chair: Prof. Sang-Woon Jeon (Hanyang University, Korea)

Session	Title	Invited Speakers
16:00-17:40	Interference-Aware Edge Caching: From Fundamental Limits to Practical Designs	Dr. An Liu Distinguished Research Fellow, Zhejiang University, China
	Caching in HetNets: Throughput-Delay Trace-off Perspective	Prof. Sang-Woon Jeon Assitant Professor, Hanyang University, Korea
	Information Theoretic Caching	Dr. Sung Hoon Lim Principle Researcher, KIOST, Korea

Invited Talk 4: "Interference-Aware Edge Caching: From Fundamental Limits to Practical Designs"

Dr. An Liu, Distinguished Research Fellow, Zhejiang University, China

Abstract:
Many recent works have shown that wireless network performance can be substantially improved by exploiting caching in content-centric wireless networks (CCWN). The early works on this topic focus on exploiting caching to reduce the backhaul loading or the number of hops from the source to the destination. However, the performance of wireless networks is fundamentally limited by interference, and these existing works fail to address this issue. In this talk, we introduce an interference-aware physical layer (PHY) caching framework for CCWN. Such PHY caching design enables MIMO cooperation without the need for expensive backhaul for payload sharing. The fundamental limit of PHY caching is first analyzed and the results show that the proposed PHY caching can achieve the optimal capacity scaling law in large CCWN under Zipf popularity distribution. Then several practical PHY caching and transmission schemes are discussed. The performance of PHY caching depends heavily on the cache content placement algorithm. In many existing algorithms, the cache content placement is adaptive to the long-term popularity distribution in an offline manner. In this talk, we introduce an online PHY caching framework which adapts the cache content placement to microscopic spatial and temporary popularity variations to fully exploit the benefits of PHY caching. Specifically, the joint optimization of online cache content placement and content delivery is formulated as a mixed-timescale drift minimization problem and a low-complexity algorithm is proposed to obtain a throughput-optimal solution. Simulations show that the proposed online PHY caching framework achieves large gain over existing solutions.

Biography:
An Liu (M'09–SM'17) received the Ph.D. and the B.S. degree in Electrical Engineering from Peking University, China, in 2011 and 2004 respectively. From 2008 to 2010, he was a visiting scholar at the Department of Electrical, Computer, and Energy Engineering, University of Colorado at Boulder. He has been a Postdoctoral Research Fellow in 2011-2013, Visiting Assistant Professor in 2014, and Research Assistant Professor in 2015-2017, with the Department of Computer Science and Engineering, Hong Kong University of Science and Technology. He is currently a Distinguished Research Fellow with the College of Information Science and Electronic Engineering, Zhejiang University, supported by the Thousand Youth Talents Plan in China.

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His research interests include stochastic optimization for future wireless systems, interference-aware edge caching for content-centric wireless systems, compressive sensing and sparse signal processing. He has published more than 40 IEEE journal papers and over 40 IEEE conference papers. He has received the Excellent Graduate of Beijing City Award in 2004, Outstanding Graduate of Peking University Award in 2004, IEEE Transactions on Communications Exemplary Reviews in both year 2016 and 2017, and IEEE Transactions on Wireless Communications Best Reviewer in year 2017. He was elevated to IEEE Senior Member in 2017. He is currently an Editor of IEEE Wireless Communications Letters. He has served as Member of Technical Program Committee for several major IEEE conferences on communications.

Invited Talk 5: "Caching in HetNets: Throughput-Delay Trace-off Perspective"

Prof. Sang-Woon Jeon, Assitant Professor, Hanyang University, Korea

Abstract:
Recently, caching for heterogeneous networks (HetNets) has been actively studied. We analyze the optimal throughput–delay trade-off in content-centric mobile HetNets, where each node moves according to the random walk mobility model and requests a content object from the library independently at random, according to a Zipf popularity distribution. Instead of allowing access to all content objects via costly backhaul, we consider a more practical scenario where mobile nodes and base stations (BSs), each having a finite-size cache space, are able to cache a subset of content objects so that each request is served by other mobile nodes or BSs via multihop transmissions. Under a given caching strategy, we first characterize a fundamental throughput–delay trade-off in terms of scaling laws by introducing a general content delivery multihop routing protocol. Then, the optimal throughput–delay trade-off is characterized by presenting the optimal cache allocation strategy, which jointly finds the replication sets at mobile nodes and BSs via nontrivial variable decoupling. In addition, computer simulations are performed to validate our analytical results. We also show that the optimal strategy strictly outperforms a baseline approach, where the replication sets at mobile nodes and BSs are optimized separately.

Biography:
Sang-Woon Jeon received the B.S. and M.S. degrees in electrical engineering from Yonsei University, South Korea, in 2003 and 2006, respectively, and the Ph.D. degree in electrical engineering from the Korea Advanced Institute of Science and Technology, South Korea, in 2011. He is currently an Assistant Professor with the Department of Military Information Engineering (Undergraduate School) and the Division of Electrical Engineering (Graduate School), Hanyang University, South Korea, since 2017. From 2011 to 2013, he was a Post-Doctoral Associate with the School of Computer and Communication Sciences, Ecole Polytechnique Federale, Lausanne, Switzerland. From 2013 to 2017, he was an Assistant Professor with the Department of Information and Communication Engineering, Andong National University, South Korea. His research interests include network information theory, wireless communications, sensor networks, and their applications to the Internet of Things and big data.
Dr. Jeon received the Haedong Young Scholar Award in 2017, which was sponsored by the Haedong Foundation and given by the Korea Institute of Communications and Information Science (KICS), the Best Paper Award of the KICS journals in 2016, the Best Paper Award of the IEEE ICC in 2015, the Best Thesis Award from the Electrical Engineering Department, KAIST, in 2012, the Best Paper Award of the KICS Summer Conference in 2010, and the Bronze Prize of the Samsung Humantech Paper Awards in 2009.

Invited Talk 6: "Information Theoretic Caching"

Dr. Sung Hoon Lim, Principle Researcher, KIOST, Korea

Abstract:
Under the caching paradigm, portions of data are delivered to users before it is known what part of the data the users will request. Coding opportunities arise along at least three axes: file popularity, content similarity, and multi-user advantages. File popularity can be exploited with classical techniques, and hinges on prior statistical knowledge about the users. File similarity can be exploited with strategies akin to distributed source coding. Multiuser coding opportunities can be exploited with strategies reminiscent of network coding and hinge on a broadcast link in the delivery phase, received free of additional charges by many or all users. We start by discussing these coding opportunities. To understand their relative merits, we then discuss several different

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models, from worst-case to canonical information-theoretic models. Within these models, we discuss information-theoretic performance bounds

Biography:
Sung Hoon Lim received his B.S. degree with honors in electrical and computer engineering from Korea University, Korea, in 2005 and his M.S. degree in electrical engineering, and his Ph.D. degree in electrical engineering from Korea Advanced Institute of Science and Technology (KAIST) in 2007 and 2011, respectively. From March 2012 to May 2014, he was with Samsung Electronics and from June 2014 to July 2016 he was a postdoctoral associate in the School of Computer and Communication Sciences at Ecole Polytechnique Federale (EPFL), Lausanne, Switzerland. He is currently with the Korea Institute of Ocean Science and Technology (KIOST), Busan, Korea. His research interests are in information theory, communication systems, data compression, underwater communication, internet of things, and coding theory.

October 18th (Thursday), 2018

Special Session III: A.I. and Machine Learning

08:30-10:10 | Crystal Hall 1

Chair: Prof. Taesup Moon (Sungkyunkwan University, Korea)

Session	Title	Invited Speakers
08:30-10:10	Selective Inference for Unsupervised Learning and Its Application to Heterogeneous Biomedical Data Analysis	Prof. Ichiro Takeuchi Nakoya Institute of Technology, Japan
	Fully Convolutional Pixel Adaptive Image Denoiser	Prof. Taesup Moon Sungkyunkwan University, Korea
	Machine Learning for Communication Systems	Prof. Jun Won Choi Hanyang University, Korea

Invited Talk 7: "Selective Inference for Unsupervised Learning and Its Application to Heterogeneous Biomedical Data Analysis"

Prof. Ichiro Takeuchi, Nakoya Institute of Technology, Japan

Abstract:
In this talk, we introduce Selective Inference, which has been recently demonstrated to be an effective statistical analysis technique for data-driven scientific discovery, and mainly talk about its application to heterogeneous medical data analysis. When analyzing a medical data set containing heterogeneous samples, one commonly taken approach is the following two-stage method: 1) identify homogeneous groups of samples by clustering, and 2) find genetic factors which characterize each of the identified groups. Unfortunately, however, such two-stage analysis results are often biased since the clustering in the 1st stage and the inference in the 2nd stage are conducted by using same data. In this talk, we show that, by using selective inference framework, we can effectively correct the clustering bias, and demonstrate its effectiveness by applying the method to single cell data analysis.

Biography:
Kyunghan Lee received his B.S., M.S., and Ph.D. degrees in Electrical Engineering from Korea Advanced Institute of Science and Ichiro Takeuchi is a professor at Nagoya Institute of Technology, Japan. He received B. Eng., M. Eng., and D. Eng. degrees from Nagoya University, Japan, in 1996, 1998, and 2000, respectively. After he worked as a post-doctoral researcher in Montreal, Canada, under Prof. Yoshua Bengio's supervision, he got tenured assistant professor position at Mie University, Japan in 2001, and associate and full professor positions at Nagoya Institute of Technology in 2008 and 2015, respectively. His research interests include theory and algorithm of machine learning and its application to bio-medical and material

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sciences. Many of his machine learning studies have been published in top conferences of machine learning and data mining such as ICML, NIPS, KDD, while his application studies to bio-medical and material sciences have been published in high-impact journals in each domain.

Invited Talk 8: "Fully Convolutional Pixel Adaptive Image Denoiser"

Prof. Taesup Moon, Sungkyunkwan University, Korea

Abstract:
In this talk, we propose a new denoising algorithm, dubbed as Fully Convolutional Adaptive Image DEnoiser (FC-AIDE), that can learn from offline supervised training set with a fully convolutional neural network architecture as well as adaptively fine-tune the denoiser for each given noisy image. We mainly follow the framework of the recently proposed Neural AIDE, which formulates the denoiser to be context-based pixelwise affine mappings and utilizes the unbiased estimator of MSE of such denoisers. The three main contributions we make to significantly improve upon the original Neural AIDE are the followings; 1) implementing a novel fully convolutional architecture that boosts the base supervised model, 2) introducing data augmentation for adaptive fine-tuning to achieve much stronger adaptivity, and 3) proposing an effective unknown noise level estimation method. As a result, FC-AIDE is shown to significantly outperform the state-of-the-art CNN-based denoisers on two standard benchmark dataset as well as on a much challenging blind denoising dataset, in which nothing is known about the noise level, noise distribution, or image characteristics.

Biography:
Taesup Moon received the B.S. degree in electrical engineering from Seoul National University in 2002 and the M.S. and Ph.D. degrees in electrical engineering from Stanford University in 2004 and 2008, respectively. From 2008 to 2012, he was a Research Scientist with Yahoo! Labs, Sunnyvale, CA, and he held a Post-Doctoral Researcher appointment with the Department of Statistics, UC Berkeley, from 2012 to 2013. From 2013 to 2015, he was a Research Staff Member with Samsung Advanced Institute of Technology, Samsung Electronics, Inc. From 2015 to 2017, he was an Assistant Professor at the Department of Information and Communication Engineering, Daegu-Gyeongbuk Institute of Science and Technology (DGIST). Since March 2017, he has been an Assistant Professor at the School of Electronic and Electrical Engineering, College of Information and Communication Engineering, Sungkyunkwan University (SKKU).
His research interests include diverse areas such as machine learning (deep learning), information theory, signal processing, speech recognition, and remote sensing. He is a recipient of GE Scholarship and Samsung Scholarship.

Invited Talk 9: "Machine Learning for Communication Systems"

Prof. Jun Won Choi, Hanyang University, Korea

Abstract:
In this talk, we will discuss the role of machine learning for building intelligent communication systems. We first introduce the recent advances in deep learning and discuss the ongoing research issues on application of deep learning to communications. We highlight various challenges and directions to be addressed on this issue. The topic includes various machine learning methods and architectures in application to mmWave communications, MIMO detection, sparse recovery problem, and abnormal behavior detection.

Biography:
Jun-Won Choi received Ph. D. degree in Electrical and Computer Engineering, University of Illinois at Urbana-Champaign. Between 2010-2013, he joined Qualcomm (San Diego, USA). He is currently an Associate Professor in Electrical and Biomedical Engineering Department, Hanyang University. His research area includes signal processing, machine learning, wireless communications, and intelligent transportation.

Special Sessions

October 18th (Thursday), 2018

Special Session IV: 5G Systems and Services

10:30-12:10 | Crystal Hall 1

Chair: Mr. KiBum Kwon (Standard Research Office in ITL, Korea)

Session	Title	Invited Speakers
10:30-12:10	Leading 5G Trials to Commercial Reality	Dr. Sungho Cho SKTelecom, Korea
	Status of 5G Technologies and Services for Commercialization in KT	Dr. Jemin Chung KT, Korea
	Trends of 5G Standard in 3GPP	Mr. KiBum Kwon General Manager of Standard Research Office in ITL, Korea

Invited Talk 10: "Leading 5G Trials to Commercial Reality"

Dr. Sungho JO, Sr.Director, Network R&D Center, SKTelecom, Korea

Abstract:

SKTelecom is No.1 mobile operator in south korea, and has made a lot of world 1st , national 1st commercialization since CDMA. SKTelecom has prepared 5G since 2014 and has been one of 5G leading company globally. The presentation shows SKTelecom's 5G strategy,development status and outputs which has achieved since 2016. SKtelecom has been considering 5G usecases so much, made a meaningful trial including World first 5G Connected car, 5G Autonomous car, AR & VR solution and World 1st Perfect 5G Network trial(LTE+3.5GHz+28GHz). And this presentation also shows SKTelcom's 5G roadmap.

Biography:

Mr. Sungho Jo as the Senior Director, The Head of Access Network. Lab is currently responsible for developing 5G, 4G, IoT Access Networks at SK Telecom R&D. He joined SK Telecom in 1997, and worked for the network operation division. From 2001, he has not only contributed commercialization of CDMA1X and EVDO but also took a responsibility for WCDMA development of SK Telecom. Since 2011, he has successfully led the Korea-first LTE launch, the world-first multi-carrier deployment, the world-first nation-wide HD Voice (VoLTE) commercialization, the world-first LTE-A (Carrier Aggregation) commercialization, and directing LTE evolution and beyond LTE-A of SK Telecom as the head of Commercialization part at Access Network Lab. He also led a successful LoRa IoT Network Commercialization in 2016.He led 5G Tech Lab and has been the head of Access Network. Lab since 2017.

His current interest mainly focuses on next generation communication system like 5G, SDN/NFV and LTE-A Evolution, LPWA,IoT

He received a Bachelor degree in the department of Electronic Engineering at Kyungpook National University (KNU) and received a Master of Business Administration (MBA) degree at Korea University.

Invited Talk 11: "Status of 5G Technologies and Services for Commercialization in KT"

Dr. Jemin Chung, Senior Principal Research Engineer, KT, Korea

Abstract:

5G has been known to provide new innovative services like autonomous connected cars, massive IoT, or smart factories based upon such novel features of enhanced mobile broadband, ultra reliable and low lantecy, massive machine type communication. Since the first announcement of 5G future vision in MWC 2015, KT hasn't just been leading the key technologies needed to realize the vision to come up with the first technological specifications for 5G, but also showed to the public some of the futuristic applications that can show the 5G features in the most intuitive way in Pyeongchang Olympic very successfully.

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As the spectrum as well as the initial systems and equipments based on global standards, that is, 5G NR, are to be available soon, there has been the increaing interests for commercial applications and services which may be coming into market from various sectors and industries. In this session, it will be presented in a brief manner what these commercial services would look like in near future, and how they can be achieved in the most efficient way in terms of the technologies.

Biography:
Jemin Chung is currently the Project Manager in Infra Lab. of Institute of Convergence Technology. He joined KT in 1996 and has been working on various wireless areas including 3G, Mobile WiMAX, and LTE related R&D project. He also had been involved in the development of Smart Grid technologies and services, and had worked in CTO office for corporate technology strategy. Since 2016, he has been leading the development project for 5G core network technologies and vertical services in KT.
He received the B.S. & M.S. degrees in Physics from the Seoul National University in 1994 and in 1996, respectively. His main research areas are wireless technologies and applications.

Invited Talk 12: "Trends of 5G Standard in 3GPP"

Dr. Sueng Yong Park, Kulcloud, Korea

Abstract:
In order to know what the 5G system and services are, it is important to check the trends of 5G standard in 3GPP since the 3GPP is actually a single organization to build a standard for the IMT-2020 system in commercial market point of view.
So, this presentation shows current status the 5G system in 3GPP related on roadmap of IMT-2020 standard. In details, major features in NR phase 1 (release 15) and phase 2 (release 16) will be addressed in RAN(Radio Access Network) point of view.

Biography:
Mr. KiBum Kwon is General Manager of Standard Research Office in ITL. He joined ITL in 2013 and has been working as delegate for 3GPP TSG RAN and RAN WG2 issues (RRC, MAC, etc). He was worked for Pantech co. Ltd (2009 ~ 2013) as a delegate for RAN WG1 and 2. He also was a Secretary of the Wireless Technology Committee in 5G forum. (2015 ~ 2017)
He received the B.S. degree, M.S. degree and Ph. D. candidate in Electronic Engineering from Ajou University.

Special Sessions

October 19th (Friday), 2018

Special Session V: Innovations and Trends at Edges

08:30-10:10 | Crystal Hall 1

Chair: Prof. Yung Yi (KAIST, Korea)

Session	Title	Invited Speakers
08:30-10:10	FogOS: Towards a New Edge Computing Architecture	Prof. Yung Yi KAIST, Korea
	Edge Networking and Orchestration Platform for E2E Network Slicing	Dr. Nakjung Choi Nokia Bell Lab, USA
	A Service Application Platform over IoT Blockchain	Jae-Hoon Kim Ajou University, Korea

Invited Talk 13: "FogOS: Towards a New Edge Computing Architecture"

Prof. Jinwoo Shin, KAIST, Korea

Abstract:
As the proliferation of mobile devices ignited cloud computing, it is expected that increasing development and deployment of IoT services will expedite the era of fog computing. Fog computing brings computing, storage, and networking even closer to end users and devices for services with better QoS. We introduce Fog Operating System (FogOS), a fog computing architecture for IoT services. We take the perspective of designing an operating system, practicing the architectural lessons from the long history of operating systems. We focus on addressing the challenges raised by (i) diversity and heterogeneity of IoT services and (ii) edge devices that are owned by individuals and different owners, and presenting how FogOS is designed to effectively and efficiently provide and manage such IoT services. We provide a city-scale surveillance use case to demonstrate FogOS in action.

Biography:
Yung Yi received his B.S. and the M.S. in the School of Computer Science and Engineering from Seoul National University, South Korea in 1997 and 1999, respectively, and his Ph.D. in the Department of Electrical and Computer Engineering at the University of Texas at Austin in 2006. From 2006 to 2008, he was a post-doctoral research associate in the Department of Electrical Engineering at Princeton University. Now, he is a full professor at the Department of Electrical Engineering at KAIST, South Korea. His current research interests include applied machine learning, IoT systems, and design and analysis of networking and wireless communication systems. He received the best paper awards at IEEE SECON 2013, ACM MOBIHOC 2013, and IEEE William R. Bennett Award 2016.

Invited Talk 14: "Edge Networking and Orchestration Platform for E2E Network Slicing"

Dr. Nakjung Choi, Nokia Bell Labs., USA

Abstract:
Network slicing stands for a concept in which the physical network infrastructure is logically partitioned to serve multiple, possibly disparate, sets of business requirements. Each network slice represents an independent virtualized end-to-end network and allows operators to run different deployments based on different architectures in parallel. It is motivated by the need for multi-purpose network capabilities that can be elastically scaled depending on quickly changing business needs, while a key enabler for slicing have clearly been the recent advances in network virtualization. For this purpose, we need highly flexible and controllable e2e network architecture and orchestration platform, especially for edge networks to manage dynamic resources. In this talk, the overview of SDN-based edge networking, its automation, enterprise use cases and orchestration platform to dynamically deploy services is given.

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Biography:
Nakjung Choi is a member of technical staff in ENSA (End-to-end Network and Service Automation) at Nokia Bell Labs, Murray Hill, New Jersey, since April 2010. He received his B.S. (magna cum laude) and Ph.D. at the School of Computer Science and Engineering, Seoul National University in 2002 and 2009, respectively. Also, he has received several awards such as Best Paper Awards and Awards of Excellence. His research is focused on SDN/NFV/cloud, 4G/5G/IoT and end-to-end 5G slicing.

Invited Talk 15: "A Service Application Platform over IoT Blockchain"

Jae-Hoon Kim, Ajou University, Korea

Abstract:
Blockchain is now one of essential business platform. From the conventional applications, such as finance or logistics, the applicability of blockchain is expanded to various application fields. The usability of blockchain can be extremely enhanced by the convergence with other technological advances. IoT is a promising technology that makes a great synergy effect with blockchain networks. A blockchain combining from the tiny end devices to central cloud systems guarantees the holistic end-to-end data reliability. In this presentation, we address the current technical advances of IoT blockchain networks and their applicability to practical fields, such as agriculture, manufacturing and other data-centric application fields.

Biography:
He received the B.S., M.S., and Ph.D. degrees in Management Science from the Korea Advanced Institute of Science and Technology (KAIST) in 1996, 1998, 2002. His interests include IoT networks, blockchain platforms ubiquitous networks. He has developed various network operation frameworks and simulation test-beds. Also, he has experience on the mobile service design and strategy. He served as a system architect of wireless systems in SAMSUNG Electronics and a system engineer in SK Telecom, Korea. Currently, he is now a faculty member of Industrial & Information Systems Engineering in Ajou University, Korea. He is a member of the IEEE Communications Society and the IEEE Vehicular Technology Society.

Special Sessions

October 19th (Friday), 2018

Special Session VI: Industrial IoT

10:30-12:10 | Crystal Hall 1

Chair: Prof. Kae Won Choi (Sungkyunkwan University, Korea)

Session	Title	Invited Speakers
10:30-12:10	Towards Realization of Long-Range Wireless Powered Sensor Networks	Prof. Kae Won Choi Sungkyunkwan University, Korea
	Introduction of mmWave Moving Network	Dr. Ilkyu Kim Electronics and Telecommunications Research Institute(ETRI), Korea
	Future of Smart Manufacturing	Dr. Soon-youl Lee Sr Director, KPMG, Korea

Invited Talk 16: "Towards Realization of Long-Range Wireless Powered Sensor Networks"

Prof. Kae Won Choi, Sungkyunkwan University, Korea

Abstract:

As the era of internet of things (IoT) emerges, powering massive IoT devices becomes a great challenge in need of immediate attention. This challenge can be resolved by the radio frequency (RF) wireless power transfer (WPT) technology that remotely supplies power to a distant sensor device. In this talk, some issues arising in designing wireless-powered sensor networks (WPSNs) are addressed. This talk covers two approaches for realizing a long-range WPSN: one is to enhance the power transfer efficiency by beam focusing, and the other is to reduce the power consumption of a sensor device by duty cycling. This talk introduces a prototype WPSN testbed that performs beam focusing with a large-scale antenna array with 64 antenna elements. By demonstrating that a sensor node can perpetually operate at the distance of 50 meters, the potential of turning the WPSN concept into reality is shown.

Biography:

Kae Won Choi received the B.S. degree in Civil, Urban, and Geosystem Engineering in 2001, and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Science in 2003 and 2007, respectively, all from Seoul National University, Seoul, Korea. From 2008 to 2009, he was with Telecommunication Business of Samsung Electronics Co., Ltd., Korea. From 2009 to 2010, he was a postdoctoral researcher in the Department of Electrical and Computer Engineering, University of Manitoba, Winnipeg, MB, Canada. From 2010 to 2016, he was an assistant professor in the Department of Computer Science and Engineering, Seoul National University of Science and Technology, Korea. In 2016, he joined the faculty at Sungkyunkwan University, Korea, where he is currently an associate professor in the College of Information and Communication Engineering. His research interests include RF energy transfer, visible light communication, device-to-device communication, cognitive radio, radio resource management. He has served as an editor of IEEE Communications Surveys and Tutorials from 2014, an editor of IEEE Wireless Communications Letters from 2015, an editor of IEEE Transactions on Wireless Communications from 2017.

Invited Talk 17: "Introduction of mmWave Moving Network"

Dr. Ilkyu Kim, Electronics and Telecommunications Research Institute(ETRI), Korea

Abstract:

mmWave based moving network technology will be introduced. First, MHN(Mobile Hotspot Network) system will be introduced. MHN System is based on the point to point moving wireless backhaul. Second, point to multi point mmWave moving wireless backhaul with multi-hop relay will be introduced.

Special Sessions

Biography:
Manager in the Future Mobile Communication Research Division at the ETRI in Korea. He attended the University of Seoul and the Korea Advanced Institute of Science and Technology, receiving BS and MS degrees in Electrical Engineering and Digital Communications at the University of Seoul and PhD in Information and Communication at KAIST. His laboratory at the ETRI researches various topics relating to advanced wireless networks and new forms of wireless communications.

Invited Talk 18: "Future of Smart Manufacturing"

Dr. Soon-youl Lee, Sr Director, KPMG, Korea

Abstract:
Industry 4.0 the fourth industrial revolution, is the interconnectivity of multiple information and data exchange trends in manufacturing technology. New emerging technologies like IoT(Internet of Things), Big data, Cloud/edge computing are impacting on manufacturing process and business model. Industry 4.0 constitutes convergence of digital and physical industrial systems to enhance transparency, automation, and functionality. Manufacturers are aware of the value that Industry 4.0 could deliver to their business. Unfortunately, few have a reliable roadmap for turning their pilots into performance.
Digital transformation is a journey. Strategic alignment between your business objectives and your Industry 4.0 investments is most important. Manufacturers should have a right strategy and execution plan.

Biography:
Soon-youl Lee is Sr. Director for smart manufacturing consulting service for KPMG Korea. He is over 28 years working experience for factory automation and smart manufacturing, worked for Hyundai Information technology and Rockwell Automation Korea. And he is currently served as chairman of ODVA(Industrial IoT vendor association). He has been published 2 books for smart manufacturing and industry 4.0.

Technical Paper Sessions

October 17 (Wednesday), 2018

[Session I-1] Advanced Wireless & Mobile Communication Systems and Infrastructure 1

Oct. 17, 09:00-10:40

Chair: Dr. Ahmed Saleem (Dawood University of Engineering and Technology, Pakistan)

I-1.1 **Spectral Coexistence of IMT-2020 with Fixed- Satellite Service in the 27-27.5 GHz Band**
Yeongi Cho, Hyun-Ki Kim, Ernest Edwin Ahiagbe and Han-Shin Jo (Hanbat National University, Korea)

I-1.2 **Calculated Distance Error Improvement by Using Elevation Mask in Relay Type GPS**
Norifumi Murai and Takatoshi Sugiyama (Kogakuin University, Japan)

I-1.3 **Complexity Reduction of MMSE Method for Iterative MIMO Systems**
Saleem Ahmed and Fahad Iqbal (Dawood University, Pakistan); Sooyoung Kim (Chonbuk National University, Korea)

I-1.4 **3D Beamforming for 5G Millimeter Wave Systems Using Singular Value Decomposition and Particle Swarm Optimization Approaches**
Osama Alluhaibi and Manish Nair (University of Kent, United Kingdom (Great Britain)); Amjed Hazzaa and Aza Mihbarey (Midland Refinery COmpany, Iraq); Jiangzhou Wang (University of Kent, United Kingdom (Great Britain))

I-1.5 **Spatio-temporal Mobile Data Traffic Modeling Using Fourier Transform Techniques**
Yosef Abera and Dereje H. Woldegebreal (Addis Ababa University, Addis Ababa Institute of Technology, Ethiopia)

[Session I-2] Big Data and Smart Computing 1

Oct. 17, 09:00-10:40

Chair: Prof. JongWon Kim (GIST, Korea)

I-2.1 **Stateful Container Migration employing Checkpoint-based Restoration for Orchestrated Container Clusters**
SeungYong Oh and JongWon Kim (GIST, Korea)

I-2.2 **Energy-Efficient Task Paritioning for CNN-based Object Detection in Heterogeneous Computing Environment**
EunYoung Oh (Korea Advanced Institute of Science and Technology, Korea); WanGyu Han (TmaxSoft, Korea); Eunju Yang, JaeHo Jeong, Laku Lemi and Chan-Hyun Youn (Korea Advanced Institute of Science and Technology, Korea)

I-2.3 **Location Prediction Based on Variable-order Markov Model and User's Spatio-temporal Rule**
Ying Xia, Yu Gong and Xu Zhang (Chongqing University of Posts and Telecommunications, P.R. China); Hae-Young Bae (Inha University, Korea)

I-2.4 **The Case of Big Data Platform Services for Semiconductor Wafer Fabrication Foundries**
Hung-Chang Hsiao (National Cheng Kung University, Taiwan)

Technical Paper Sessions

[Session I-3] u-Healthcare Systems, and Bio- informatics & Its Applications 1

Oct. 17, 09:00-10:40

Chair: Prof. Ki Chon (University of Connecticut, USA)

I-3.1 **An approach on a combination of higher-order statistics and higher-order differential energy operator for detecting pathological voice with machine learning**
Jihye Moon and Sanghun Kim (ETRI, Korea)

I-3.2 **The Design of Cost Efficient Health Monitoring System based on Internet of Things and Big Data**
Muhammad Rifqi Maarif, Agung Priyanto, Chanief Budi Setiawan and Puji Winar Cahyo (Jenderal Achmad Yani University Yogyakarta, Indonesia)

I-3.3 **Automation of Data Collection Techniques for Recording Food Intake: a Review of Publicly Available and Well-Adopted Diet Apps**
Klaus Fuchs (ETH Zurich & Auto-Id Labs ETH / HSG, Switzerland); Mirella Haldimann (EAWAG, Switzerland); Denis Vuckovac (ETH Zurich, Switzerland); Alexander Ilic (University of St. Gallen, Switzerland)

I-3.4 **Medication adherence supporting model based on markov logic network using tuberculosis patients data**
Bumhwi Kim, Kee-Koo Kwon, Kyu Hyung Kim and Eun Chang Choi (ETRI, Korea); Jae-Wook Nah (Jeyun Medical Inc., Korea)

[Session I-4] Information & Communication Theory, and Their Applications 1

Oct. 17, 09:00-10:40

Chair: Prof. Joongheon Kim (Chung-Ang University, Korea)

I-4.1 **Efficient SIC-MMSE Detection Using Neumann Series Expansion**
Zhilin Fu, Satya Chan and Sooyoung Kim (Chonbuk National University, Korea)

I-4.2 **A Simple Relaxation Scheme for Polar Codes**
Sungkwon Hong (Interdigital Asia LLC, Korea); Onur Sahin, Chanxuan Ye and Fengjun Xi (InterDigital Communications, USA)

I-4.3 **A brief review: The Roles in Triggering Knowledge Management Scheme Adoption to Increase Enterprise Performance**
Richardus Eko Indrajit (ABFI Institute of Perbanas, Indonesia); Saide Saide (Information System (PRO Knowledge Research), State Islamic University of Sultan Syarif Kasim Riau, Indonesia & Information Management, National Taiwan University of Science and Technology, Taiwan); Rahmat Trialih (Department of Information System, Faculty of Computer Science, Brawijaya University, Malang, 65145, Indonesia); Hsiao Wei (National Taiwan University of Science and Technology, Taiwan); Herzavina Herzavina (Information Sytem, State Islamic University of Sultan Syarif Kasim Riau, Indonesia & Information Management, National Taiwan University of Science and Technology, Taiwan)

I-4.4 **Performance of SIM/S-QAM FSO Systems with Phase Errors in Gamma-Gamma Turbulence Channels**
Thang Nguyen and Anh-Tuan H. Bui (The University of Aizu, Japan); Ngoc Dang (Posts and Telecommunications Institute of Technology, Vietnam); Anh T. Pham (The University of Aizu, Japan)

I-4.5 **Minimizing Backup Capacity Considering Routings in Primary and Backup Networks for Random Multiple Link Failures**
Soudalin Khouangvichit (The University of Electro-Communications, Japan); Eiji Oki (Kyoto University, Japan); Nattapong Kitsuwan (The University of Electro-Communications, Japan)

Technical Paper Sessions

[Session I-5] Internet of Things (IoT), Internet of Everything (IoE), Web of Objects (WoO)

Oct. 17, 09:00-10:40

Chair: Dr. Sunil Chinnadurai (Hanyang University, Korea)

I-5.1 **Towards a Blockchain-enabled IoT Platform using oneM2M Standards**
ChanHyung Lee and Lewis Nkenyereye (Sejong University, Korea); Nak-Myoung Sung (Korea Electronics Technology Institute, Korea); JaeSeung Song (Sejong University, Korea)

I-5.2 **Relational localization based Augmented reality Interface for IOT applications**
Sandhya Baskaran and Hari Kumar Nagabushanam (Ericsson Research, India)

I-5.3 **A Shift From Monolithic to Compound Digitization: A New Perspective of Digital Economy**
Toshihiko Yamakami (ACCESS, Japan)

I-5.4 **Exploring Web Objects enabled Data-Driven Microservices for E-Health Service Provision in IoT Environment**
Muhammad Aslam Jarwar, Sajjad Ali and Il Young Chong (Hankuk University of Foreign Studies, Korea)

[Workshop I] Invited Paper Session

Oct. 17, 09:00-10:40

Chair: Prof. Dr. Peter Peer (University of Ljubljana)

W-I.1 **Segmentation and Reconstruction of 3D Models from a Point Cloud with Deep Neural Networks**
Jurij Slabanja, Blaž Meden, Peter Peer, Aleš Jaklič and Franc Solina (University of Ljubljana, Slovenia)

W-I.2 **Full-Duplex Wireless-Powered IoT Networks With Unmanned Aerial Vehicle**
Han-Ting Ye, Xin Kang and Ying-Chang Liang (University of Electronic Science and Technology of China, P.R. China); Jingon Joung (Chung-Ang University, Korea)

W-I.3 **Combined Access Barring for Energy and Delay Constrained Machine Type Communications**
Waqas Tariq Toor (Khwaja Fareed University of Engineering and Information Technology, Pakistan); Hu Jin (Hanyang University, Korea)

W-I.4 **Deep-learning/LSTM Based Cooperative Spectrum Prediction for Cognitive Networks**
Bethelhem Seifu Shawel and Dereje H. Woldegebreal (Addis Ababa University, Ethiopia); Sofie Pollin (KU Leuven, Belgium)

W-I.5 **On Fronthaul Compression and Transmission Strategies for Utility Maximization in C-RAN**
Zhenjun Dong and Jian Zhao (Nanjing University, P.R. China)

W-I.6 **IoT Based UAV Platform for Emergency Services**
Soumya Kanti Datta, Jean-Luc Dugelay and Christian Bonnet (Institut Eurecom, France)

Technical Paper Sessions

[Session P-1] Poster Session 1

Oct. 17, 09:00-10:40

Chair: Prof. Thabet Kacem (University of the District of Columbia, USA)

P-1.1 **Energy Efficient MIMO-NOMA HCN with Iot for Wireless Communication Systems**
Sunil Chinnadurai (Chonbuk National University, Korea); Dongweon Yoon (Hanyang University, Korea)

P-1.2 **Artificial Intelligence in 5G Technology: A Survey**
Manuel Eugenio Morocho Cayamcela and Wansu Lim (Kumoh National Institute of Technology, Korea)

P-1.3 **Efficient hybrid NOMA schemes using multiple signatures**
Ok-Sun Park (ETRI, Korea)

P-1.4 **Map-based System-level Performance of Full-duplex in Small Cell Networks**
Moon Kyu Jo, Xi Lei Chen, Kyung Lin Ryu and Kwang Soon Kim (Yonsei University, Korea)

P-1.5 **WLAN throughput improvement using dynamic sensitivity control technique**
Sungjin You and Kyu-Min Kang (ETRI, Korea)

P-1.6 **System-level Data Rate Evaluation for IMT-2020 Urban Micro Channel Model**
InSeok Lee and SeongJun Oh (Korea University, Korea)

P-1.7 **Wake-Up Latency Evaluation of IEEE 802.11ba WUR System**
Sunghyun Hwang, Igor Kim, Kyu-Min Kang and Seung Keun Park (ETRI, Korea)

P-1.8 **A Study on Management of Access in Industry IoT based 5G New Radio Standalone System**
Hwang You-sun (ETRI, Korea)

P-1.9 **A Method for Analyzing Spectral Efficiency using Real-Field Measurement Data**
Jungsun Um, Igor Kim and Seung Keun Park (ETRI, Korea)

P-1.10 **Scheduling for Machine Type Communications in LTE Systems**
Yared Zerihun Bekele and Young-June Choi (Ajou University, Korea)

P-1.11 **prototype GOD: prototype Generic Objects Dataset for an Object Detection System based on Bird's -Eye View**
Young-Suk Yoon, Joong-Won Hwang, Sung-Uk Jung and Jongyoul Park (ETRI, Korea)

P-1.12 **An Ensemble Method of CNN Models for Object Detection**
Jinsu Lee (University of Science and Technology & ETRI, Korea); Sang-Kwang Lee and Seong-Il Yang (ETRI, Korea)

P-1.13 **The thematic landscape of virtualization technologies (1998 - 2013)**
Hongseok Jeon (ETRI, Korea)

P-1.14 **Social Link Prediction and Feature Analysis in Mobile Game**
Dae-Wook Kim, Hyoungjin Kwon and Sang-Kwang Lee (ETRI, Korea); Wooyoung Jeong (Hongik University, Korea); Seong-Il Yang (ETRI, Korea)

P-1.15 **Learning-Based Distributed Resource Allocation in Asynchronous Multicell Networks**
Jonggyu Jang and Hyun Jong Yang (UNIST, Korea); Sunghyun Kim (ETRI, Korea)

P-1.16 **Algorithm and System for improving the medication adherence of tuberculosis patients**
Kyu Hyung Kim, Bumhwi Kim, Albert Jin Chung, Kee-Koo Kwon and Eun Chang Choi (ETRI, Korea); Jae-Wook Nah (Jeyun Medical Inc., Korea)

Technical Paper Sessions

P-1.17 Design of Connected Data Lake System based on Micro Cloud Storage
Sun Park and Byungrae Cha (GIST, Korea); Yunseok Cha, Jaeyun Mo and Suhui Oh (Research Institute GenoTech Corporation Gwangju, Korea); Jongwon Kim (GIST, Korea)

P-1.18 Rolling shutter compensation for vehicle to vehicle positioning using CMOS sensor camera
Trong-Hop Do and Myungsik Yoo (Soongsil University, Korea)

P-1.19 Boosting Edge Computing Performance Through Heterogeneous Manycore Systems
Ramneek Sekhon, Seung-Jun Cha, Seung Hyub Jeon, Yeon Jeong Jeong, Jin Mee Kim and Sung-In Jung (ETRI, Korea); Sangheon Pack (Korea University, Korea)

P-1.20 Design and Implementation of Trust Domain Gateway System
Byeongok Kwak and Taesoo Jeong (ETRI, Korea)

P-1.21 Network Attack Traffic Detection for Calculating Correlation of the Flow
Jee Tae Park, Young-Hoon Goo, Kyu-Seok Shim, Ui-Jun Baek and Myung-Sup Kim (Korea University, Korea)

P-1.22 A study on energy effective and secure consensus algorithm for private blockchain system(PoM: Proof of Majority)
Keecheon Kim, Jun-Tae Kim and Jungha Jin (Konkuk University, Korea)

P-1.23 A Performance Analysis of Lightweight Cryptography Algorithm for Data Privacy in IoT Devices
Young Sae Kim (A Performance Analysis of Lightweight Cryptography Algorithm for Data Privacy in IoT Devices)

P-1.24 The method for generating a trust field in wireless distributed communication systems
Hyungu Hwang (ETRI, Korea)

P-1.25 Abnormal Traffic Detection Mechanism for Protecting IIoT Environments
Byoung-Koo Kim and Yousung Kang (ETRI, Korea)

P-1.26 A Secret Key Updating Method between Devices for Secure Smart Services
Jin-Hee Han and Geonwoo Kim (ETRI, Korea)

P-1.27 An Access Control Method for Vehicle Management System
Daewon Kim, Hong-Il Ju, Boheung Chung and Jung-Chan Na (ETRI, Korea)

P-1.28 ESS Simulation based on PV Generation Prediction
Tai Yeon Ku and Wan-Ki Park (ETRI, Korea); Hoon Choi (Chungnam National University, Korea)

P-1.29 Long-Range Transmission of Photovoltaic Climate Information through the LoRa Radio
Jin-Doo Jeong, Youngmee Shin and Il-Woo Lee (ETRI, Korea)

P-1.30 Smart Energy System for Island Operation of Community Energy Facility for Smart Grid
Sewan Heo, Jinsoo Han and Wan-Ki Park (ETRI, Korea)

P-1.31 Spectral asymmetry of EEG signals in transition from conscious to unconscious state
Seong-Ho Park, In-Young Jung and Hyun Shin (Soongsil University, Korea)

P-1.32 An Enhanced Range Estimation Algorithm based on Trimmed WPD for Passive UHF RFID Systems
Kyuwon Han, Sang Hyun Mo, Hoesung Yang and Kang Bok Lee (ETRI, Korea)

P-1.33 IoT-Aided Fingerprint Indoor Positioning Using Support Vector Classification
Yiqiao Wei and Seung-Hoon Hwang (Dongguk University, Korea); Sang-Moon Lee (JMP Systems, Korea)

P-1.34 SER Performance of Stepped θ-QAM in the Presence of Impulsive Noise
Hyungkook Oh, Dongweon Yoon and Seongjin Ahn (Hanyang University, Korea)

Technical Paper Sessions

P-1.35 A Sandpile based Load Distribution over Edges
Yong-Hyuk Moon and Yong-Ju Lee (ETRI, Korea)

P-1.36 Performance of Reed-Solomon Based Quasi-Cyclic LDPC Codes Based on Protograph
Inseon Kim and Hong-Yeop Song (Yonsei University, Korea)

P-1.37 Convolutional Autoencoder for Compressive Symbol Detection
Jae-Hyuck Park and Yookyung Kim (ETRI, Korea)

P-1.38 Probabilistic Collision Threat Assessment for Autonomous Driving at Unsignalized T-Junctions: Merging into Traffic on the Major Road and Being Merged by Traffic on the Minor Road
Samyeul Noh (ETRI, Korea)

P-1.39 The Mediation Effect of Traffic Locus of Control on the Relationships between Psychological Characteristics and Reckless Driving of Drivers
Yoonsook Hwang, Do Hyun Kim, Byung-Tae Jang and Hyun-Kyun Choi (ETRI, Korea)

P-1.40 Estimating Attentional State of a Driver: Interacting Effects of Task Demands and Cognitive Capacities
Seonggyu Choe, Hyun-Jun Jeon and Oh-sang Kwon (Ulsan National Institute of Science and Technology, Korea)

P-1.41 Conceptual Design of Driver-Adaptive Human-Machine Interface for Digital Cockpit
Jin-Kyu Choi, YoungJin Kwon, Ju Il Jeon, Kyongho Kim, Hyun-Kyun Choi and Byung-Tae Jang (ETRI, Korea)

P-1.42 IoT lighting address scheme and profile API design for interoperability
Jung-Sik Sung (ETRI, Korea)

P-1.43 Method of Intelligent Docent Service in Self-Learnable IoT Common Software Engine using Abstraction Technology
Sunhwan Lim and Donghwan Park (ETRI, Korea)

P-1.44 Quality Adaptation Algorithm for Streaming over CoAP
Waqas Ur Rahman, Young-Seok Choi and Kwangsue Chung (Kwangwoon University, Korea)

P-1.45 A Beamforming based Wireless Energy Transmitter and Energy Harvester for IoT/M2M Applications
Jin-Sup Kim (Korea Electronics Technology Institute, Korea); Wonjae Jung, Nam-Pyo Hong, Ji-Hoon Lee and Kyu-Hyun Nam (Kookmin University, Korea); Peter Jang (Epic Solution Co., Ltd., USA)

P-1.46 The method of providing IoE-based hierarchical context awareness
Eunjoo Kim, Jong-arm Jun and Nae-Soo Kim (ETRI, Korea)

P-1.47 An Agent-Based Simulation Modeling with Deep Reinforcement Learning for Smart Traffic Signal Control
Ingook Jang (ETRI, Korea); Donghun Kim (Kwangwoon University, Korea); Donghun Lee and Young-Sung Son (ETRI, Korea)

P-1.48 Multiagent Reinforcement Learning in Escape Scenario
Donghun Lee, Seonghyun Kim and Young-Sung Son (ETRI, Korea)

P-1.49 Energy Efficient Task allocation for Distributed Multi-agent System
Seonghyun Kim, Ingook Jang and Young-Sung Son (ETRI, Korea)

P-1.50 Virtualizing Non-OCF Devices into OCF Ecosystem
Joo-Chul Lee, Sang-Ha Kim and Seungyun Lee (ETRI, Korea)

P-1.51 Multi-Log Analysis of Vehicle Accidents for Public Safety Services
Hyunho Park, Eunjung Kwon, Sungwon Byon, Eui-Suk Jung and Yong-Tae Lee (ETRI, Korea); Gi-Yong Kim (Chung-Ang University, Korea)

Technical Paper Sessions

P-1.52 Design and Implementation of Bridging System for Integrating Smart Home with Connected Vehicles
Wonsuk Lee and Seungyun Lee (ETRI, Korea)

P-1.53 Hybrid Active User Detection for Massive Machine-type Communications in IoT
Guyoung Lim, Hyoungju Ji and Byonghyo Shim (Seoul National University, Korea)

P-1.54 Prefetched Asymmetric Authentication for Infrastructureless D2D Communications: Feasibility Study and Analysis
Nhu-Ngoc Dao, Woongsoo Na, Yunseong Lee, Duc Nghia Vu and Sungrae Cho (Chung-Ang University, Korea)

P-1.55 A Cell Detection Technique for Downlink Channel in Underwater Multicell Networks
Muhammad Asim and Yong Soo Cho (Chung-Ang University, Korea)

P-1.56 Methods to Evaluate and Mitigate the Interference from Maritime ESIM to Other Services in 27.5.29.5 GHz Band
Ernest Edwin Ahiagbe, Daniel K. Tettey and Han-Shin Jo (Hanbat National University, Korea)

P-1.57 The Effect of Pulse Signal Waveform on Bandwidth in Pulse Radar System
Minsoo Kang, Bongsu Kim and HyungJung Kim (ETRI, Korea)

P-1.58 Performance comparison of heuristic algorithms for UAV deployment with low power consumption
Jun-Woo Cho and Jae-Hyun Kim (Ajou University, Korea)

P-1.59 Coexistence of 5G system with Fixed satellite service Earth station in the 3.8GHz Band
Ho Kyung Son (ETRI, Korea)

P-1.60 Data sharing in a collaborative product design environment based on cryptographic mechanisms
Jeongtae Kim and Soyoung Park (ETRI, Korea)

P-1.61 AEO(Authorized Economic Operator) Automated Platform for Supply Chain Security
Jeyoun Dong, Kiduk Kim and Kiyoung Moon (ETRI, Korea)

P-1.62 Drone Trajectory Planning Based on Geographic Information System for 3D Urban Modeling
Somaiieh Rokhsaritalemi, Abolghasem Sadeghi-Niaraki and Soo-Mi Choi (Sejong University, Korea)

P-1.63 Development and Application of the Smart Helmet for Disaster and Safety
Mingi Jeong, Hyesun Lee, MyungNam Bae, Sun-Hwa Lim, Dong-Beom Shin and Kang Bok Lee (ETRI, Korea)

P-1.64 Design of RPC-based Blockchain Monitoring Agent
KyungChan Ko, Chaehyeon Lee, Taeyeol Jeong and James W. Hong (POSTECH, Korea)

P-1.65 Azalea-Unikernel: Unikernel into Multi-kernel Operating System for Manycore Systems
Seung Hyub Jeon, Seung-Jun Cha, Ramneek, Yeon Jeong Jeong, Jin Mee Kim and Sungin Jung (ETRI, Korea)

P-1.66 Anticipating Spectral Efficiency of 4G LTE Networks in Korea
Igor Kim, Jungsun Um and Seung Keun Park (ETRI, Korea)

P-1.67 Implementation of docker-based smart greenhouse data analysis platform
Wook Hyun, Miyoung Huh and Juyoung Park (ETRI, Korea)

P-1.68 Detect and avoid system based on multi sensor fusion for UAV
MyungSeok Ki and Jihun Cha (ETRI, Korea); Hyeonsu Lyu (UNIST, Korea)

P-1.69 Flexible Bandwidth Allocation Scheme for Converged Optical Access Networks
Jung-Yeol Oh (Electronics and Telecommunications Research & Optical Network Research Group, Korea); Hwan Seok Chung (ETRI, Korea)

Technical Paper Sessions

P-1.70 Importance-aware SDN control mechanism for real-time data distribution services
Won-Tae Kim, Seongjin Yun, Jun-Hong Park and Hyeong-su Kim (Koreatech University, Korea)

P-1.71 Lowering the Barriers of Cloud -based Vehicular Applications using Software Defined Network
Lionel Nkenyereye and Jong-Wook Jang (Dongeui University, Korea)

P-1.72 A Study on SDN security enhancement using open source IDS/IPS Suricata
Kiho Nam and Keecheon Kim (Konkuk University, Korea)

P-1.73 Stereo matching validation using spherical image mapping
Wonjin Kim (Kwangwoon University, Korea); Seong-Won Lee (Kwangwoon University, USA)

P-1.74 Drone Detection and Identification System using Artificial Intelligence
DongKyu Roy Lee, Woong Gyu La and Hwangnam Kim (Korea University, Korea)

P-1.75 Video Object Composition Using Moment Change and Spline Method
Kwon Ickhwan, Hae-Min Park, Dae-Won Kang and Yeon Jun Choi (ETRI, Korea)

P-1.76 A Weighted Nuclear Norm based Fast Minimization Scheme for Infra-Red Image Restoration
Woo Yong Lee (ETRI, Korea)

P-1.77 ARStudio: AR Broadcasting System based on Multiple RGB-D Cameras
Hyunwoo Cho and Sung-Uk Jung (ETRI, Korea); Suwon Lee (Gyeongsang National University, Korea); Young-Suk Yoon, Sangheon Park and Hyung-Keun Jee (ETRI, Korea)

P-1.78 A Study on the ATSC 3.0 Service Following
Bong Ho Lee, Yang KyuTae, Sung Ik Park, Heung Mook Kim and Soon-Choul Kim (ETRI, Korea)

P-1.79 A Patent Analysis of Automated Interpretation Techniques for Glaucoma Diagnosis
Ji Sang Park, Hyeon Sung Cho and Jae Il Cho (ETRI, Korea)

P-1.80 Pitch-tuned coiled polymer actuator for large contractile strain under light-loading
Jeong Mook Lim, Dongbum Pyo and Sungryul Yun (ETRI, Korea)

P-1.81 Advanced Time Synchronization Mechanism for Low Latency Ad-hoc Networking Services
Won-Tae Kim and Hyeonyeop Shin (Koreatech University, Korea)

P-1.82 An architecture of multi-layered SDN based LTE/WiFi Network for multi-interface D2D users
Junhyuk Park and Wonyong Yoon (Dong-A University, Korea)

P-1.83 Adjacent Channel Interference from Maritime Earth Station in Motion to 5G Mobile Service
Hyun-Ki Kim, Yeongi Cho, Ernest Edwin Ahiagbe and Han-Shin Jo (Hanbat National University, Korea)

P-1.84 Comparative Analysis and Design of a Plasma based Monopole Antenna and a Metal based Monopole Antenna
Ratmalgre Koala (Chungbuk National University, Korea)

P-1.85 Contention-Based Transmission Coordination for Interfering BSs in Dense mmWave Networks
Ryangsoo Kim (ETRI, Korea); Hanbit Choi (Agency for Defence Development, Korea); Yonggang Kim and Hyuk Lim (Gwangju Institute of Science and Technology, Korea)

P-1.86 Decision Feedback Frequency Offset Estimator for Data-Pilot Multiplexed OFDM Systems
Kwanwoong Ryu, Joon-Young Jung and Heung Mook Kim (ETRI, Korea)

P-1.87 An Energy Efficient Real-Time MAC Protocol
Kyeong Tae Kim (ETRI, Korea)

P-1.88 Achieving Rate Fairness in Multipair Full-Duplex Relaying Systems
Hyeon Min Kim, Van-Dinh Nguyen, Gil-Mo Kang and Oh-Soon Shin (Soongsil University, Korea)

Technical Paper Sessions

P-1.89 **Random Access Channel Management for Handling Massive Numbers of Machine-to-Machine Communication Devices**
Daniel Anthoni Kurnia Agusta and Young-June Choi (Ajou University, Korea)

P-1.90 **Two component data representation using piecewise approximation and specific points for IoT**
Hyunjae Park and Young-June Choi (Ajou University, Korea)

P-1.91 **Mining Twitter to Identify Customers' Requirements and Shoe Market Segmentaion**
Young Seog Yoon, Hyun-Woo Oh and Kwang-Roh Park (ETRI, Korea)

P-1.92 **3GPP SA2 Architecture and Functions of 5G System**
Junseok Kim (Seoul National University, Korea); Dongmyoung Kim (SK Telecom, Korea); Sunghyun Choi (Seoul National University, Korea)

P-1.93 **A Modified Tone Injection Scheme for PAPR Reduction using Genetic Algorithm**
Won Cheol Lee, Chuyen Khoa Huynh and Joo Pyoung Choi (Soongsil University, Korea)

P-1.94 **Cluster-Chain Mobile Agent Routing Algorithm for Efficient Data Aggregation in Wireless Sensor Network**
Sasirekha S (SSN College of Engineering & SSN College of Engineering, India); Swamynathan S (Anna University, India)

P-1.95 **ADS-Bsec: A novel framework to secure ADS-B**
Thabet Kacem (University of the District of Columbia, USA); Alexandre B Barreto (Instituto de Controle do Espaço Aéreo, Brazil); Duminda Wijesekera and Paulo C.G. Costa (George Mason University, USA)

P-1.96 **Coexistence analysis between intelligent transport systems and wireless multi-gigabit service in 60GHz bands**
Suna Choi (ETRI, Korea)

P-1.97 **A Survey of Scalability Solutions on Blockchain**
Soohyeong Kim, Yongseok Kwon and Sunghyun Cho (Hanyang University, Korea)

[Session II-1] Systems, Services and Applications for ICT Convergence 1

Oct. 17, 16:00-17:40

Chair: Prof. Se-Youn Jung (Korea National Open University, Korea)

II-1.1 **A Client Based DNSSEC Validation Mechanism with Recursive DNS Server Separation**
Yong Jin and Masahiko Tomoishi (Tokyo Institute of Technology, Japan); Nariyoshi Yamai (Tokyo University of Agriculture and Technology, Japan)

II-1.2 **Sensor Positioning and Data Acquisition for Activity Recognition using Deep Learning**
Seungeun Chung, Jiyoun Lim, Kyoung-Ju Noh, Ga Gue Kim and Hyun-Tae Jeong (ETRI, Korea)

II-1.3 **A Message Sharing System that Enables Highly Accurate Space Attachment Linked with the Web**
Shunki Kitsunai (Tokyo Institute of Technology, Japan); Junji Takahashi (Kagoshima University, Japan); Yoshito Tobe (Aoyama Gakuin University, Japan)

II-1.4 **Online Visual Novel Game Framework**
Rizky Yuniar Hakkun, Kholid Fathoni, Achmad Basuki, Nana Ramadijanti and Dio Al Sabah (Politeknik Elektronika Negeri Surabaya, Indonesia)

II-1.5 **Enabling Communication Technologies for Automated Unmanned Vehicles in Industry 4.0**
Amina Fellan, Christian Schellenberger, Marc Zimmermann and Hans D. Schotten (University of Kaiserslautern, Germany)

Technical Paper Sessions

[Session II-2] Artificial Intelligence and Machine Learning 1

Oct. 17, 16:00-17:40

Chair: Prof. Yun Won Chung (Soongsil University, Korea)

II-2.1 **Reducing MAC operation in convolutional neural network with sign prediction**
Jiho Chang (ETRI, Korea); Yoonsung Choi, Taegyoung Lee and Junhee Cho (KAIST, Korea)

II-2.2 **A Design and Implementaion of Carry Distance Prediction Model using Artificial Neural Network**
Jun Young Ko, Jae-Hyun Kim and Kyeong-Rok Kim (Ajou University, Korea)

II-2.3 **Classification of Malicious Traffic Using TensorFlow Machine Learning**
Li-Der Chou, Chia-Wei Tseng, Meng-Sheng Lai and Wei-Yu Chen (National Central University, Taiwan); Kuo-Chung Chen (National Chung-Shan Institute of Science and Technology, Taiwan); Chia-Kuan Yen (National Chung Cheng University, Taiwan); Tsung-Fu Ou, Wei-Hsiang Tsai and Yi-Hsuan Chiu (National Chung-Shan Institute of Science and Technology, Taiwan)

II-2.4 **Feature Analysis on English word difficulty by Gaussian Mixture Model**
Hua Yang and Suyong Eum (Osaka University, Japan)

[Session II-3] 5G, 4G, LTE, LTE-Advanced, WLAN, WPAN, WBAN 1

Oct. 17, 16:00-17:40

Chair: Prof. Klaus Moessner (University of Surrey, UK)

II-3.1 **System-level Performance Properties of Millimeter Wave Multicell Networks**
Han-Kyul Park and Guk-Hui Shin (Seoul National University of Science and Technology, Korea); Yunbae Kim and Seung Keun Park (ETRI, Korea); Taesoo Kwon (Seoul National University of Science and Technology, Korea)

II-3.2 **Opportunistic Medium Access for Hyper-Dense Beamformed IEEE 802.11ax Wireless Networks**
Dohyun Kwon and Joongheon Kim (Chung-Ang University, Korea)

II-3.3 **Study of Almost Blank Subframe Configurations for Traffic offload in HetNets**
Nonthapat Teerasuttakorn (King Mongkut's University of Technology North Bangkok, Thailand); Kittipong Nuanyai (Phetchaburi Rajabhat University, Thailand); Alireza Zamani and Anke Schmeink (RWTH Aachen University, Germany); Soamsiri Chantaraskul (King Mongkut's University of Technology North Bangkok, Thailand)

II-3.4 **Efficient LLR Calculation for Uplink Coded Massive MIMO Systems**
Meixiang Zhang and Zhi Zhang (Yangzhou University, P.R. China); Sooyoung Kim (Chonbuk National University, Korea)

II-3.5 **LTE-LAA Scheduling Algorithm using Traffic Distribution Process**
Eung-Hyo Kim (Kyung-Hee University & MCL Lab., Korea); Park Jaewan, Tae-Yoon Park, Jong-Won Han and Een-Kee Hong (Kyunghee University, Korea); Kyung Sook Kim and Jeehyeon Na (ETRI, Korea)

II-3.6 **Design of scalable SDN based eMBMS/WLAN network architecture assisted by Fog Computing**
JanFizza Bukhari and Wonyong Yoon (Dong-A University, Korea)

Technical Paper Sessions

[Session II-4] Information & Communication Theory, and Their Applications 2

Oct. 17, 16:00-17:40

Chair: Prof. Dereje Woldegebreal (Addis Ababa Institute of Technology, Ethiopia)

II-4.1 Increasing Minimum Distance of Polar Codes with Outer Parity-Check Codes
KyungMok Oh, DaeJin Kim and Jeongseok Ha (KAIST, Korea)

II-4.2 A Hybrid ARQ Protocol for the Communication System with Multiple Channels
Chunxiang Chen and Qian Li (Prefectual University of Hiroshima, Japan)

II-4.3 "Kawulu": A Voice based Social Network using Smart Mobile Devices for the Visually Impaired Community in Sri Lanka
Kulani Sumanasekera, Mihilar Shifan, Chanduni Wickramasinghe and Shiromi Arunathilake (University of Colombo School of Computing, Sri Lanka)

II-4.4 Study on Error-Correcting Using Output Level of Correlation Receivers and Hamming Codes in CDMA Communications
Yusuke Tsuruda and Akio Tsuneda (Kumamoto University, Japan)

II-4.5 Review of Energy Efficient Resource Allocation Techniques in Massive MIMO Systems
Amare Yimer (Technical University of Darmstadt, Germany); Dereje H. Woldegebreal (Addis Ababa University, Addis Ababa Institute of Technology, Ethiopia); Abdelhak M Zoubir (Darmstadt University of Technology, Germany)

II-4.6 A Discrepancy View Model of Standardization of Web Technology
Toshihiko Yamakami (ACCESS, Japan)

[Workshop II-1] Internet Infrastructure

Oct. 17, 16:00-17:40

Chair: Sangheon Pack(Korea University, Korea)

W-II-1.1 Performance Analysis of CNI (Container Networking Interface) based Container Network
YoungKi Park, HyunSik Yang and younghan Kim (Soongsil University, Korea)

W-II-1.2 Optimal Task Offloading and Resource Allocation in Software-Defined Vehicular Edge Computing
Sukjin Choo, Joonwoo Kim and Sangheon Pack (Korea University, Korea)

W-II-1.3 Performance Analysis of RESTful API and RabbitMQ for Microservice Web Application
XianJun Hong, HyunSik Yang and Younghan Kim (Soongsil University, Korea)

W-II-1.4 A VNF Descriptor Generator for Tacker-based NFV Management and Orchestration
Nguyen Tri-Hai and Myungsik Yoo (Soongsil University, Korea)

W-II-1.5 A Congestion Contribution-based Traffic Engineering Scheme using Software-Defined Networking
Dongjin Hong, Jinyoung Kim and Jaehoon Jeong (Sungkyunkwan University, Korea)

W-II-1.6 An Automata-based Security Policy Translation for Network Security Functions
Jinhyuk Yang and Jaehoon Jeong (Sungkyunkwan University, Korea)

Technical Paper Sessions

[Workshop II-2] Advances in ICT Education Workshop

Oct. 17, 16:00-17:40

Chair: Woochun Jun (Seoul National University of Education, Korea)

W-II-2.1 A Study on Development of Selection Standards of Maker Education Teaching Aids
Woochun Jun (Seoul National University of Education, Korea)

W-II-2.2 A Study on Development of Evaluation Standards for Unplugged Activity
Woochun Jun (Seoul National University of Education, Korea)

W-II-2.3 Designing a Curriculum of Financial Big Data for College Students
Jin-Wook Baek (Ansan University, Korea)

W-II-2.4 Development of Evaluation Standards of Learners for Physical Computing
Woochun Jun (Seoul National University of Education, Korea)

W-II-2.5 A Study on the Development of Teacher Competency Standards in Digital Textbook Environment
Suk-Ki Hong and Sang-Chul Yoon (Dankook University, Korea)

[Workshop II-3] Human Interaction on Smart Mobility

Oct. 17, 16:00-17:40

Chair: Yoon, DaeSub (Electronics and Telecommunications Research Institute, Korea)

W-II-3.1 Design of the Driver-Adaptive Vehicle Interaction System
Kyongho Kim, Hyun-Kyun Choi and Byung-Tae Jang (ETRI, Korea)

W-II-3.2 Design of Driver Readiness Evaluation System in Automated Driving Environment
Hyunsuk Kim, Woojin Kim, Jungsook Kim, Seung-Jun Lee and DaeSub Yoon (ETRI, Korea)

W-II-3.3 Sensor Selection Frameworks for Practical DSM in Level 3 Automated Vehicles
Woojin Kim, Hyunsuk Kim, Seung-Jun Lee, Jungsook Kim and DaeSub Yoon (ETRI, Korea)

W-II-3.4 A BLE enabled APS for pedestrians of visually impaired
Jungsook Kim (ETRI, Korea)

W-II-3.5 A system architecture for authoring and utilizing a realistic 3D geospatial city model
Junghee Jo, Insung Jang, In-Hak Joo and JaeJun Yoo (ETRI, Korea)

W-II-3.6 Individual Stable Driving Pattern Analysis for Evaluating a Driver Readiness in the Autonomous Driving Level 2 and 3
Jinhyeok Park, Min Seok Lee and Young Jae Jang (Korea Advanced Institute of Science and Technology, Korea)

Technical Paper Sessions

October 18th (Thursday), 2018

[Session III-1] Advanced Wireless & Mobile Communication Systems and Infrastructure 2

Oct. 18, 08:30-10:10

Chair: Prof. Seokjoo Shin (Chosun University, Korea)

III-1.1 Improved SD-based Precoder Selection for MIMO-OFDM Systems with ML Detection
Jaeyoung Park and Jaekwon Kim (Yonsei University Wonju, Korea)

III-1.2 Joint Mission Assignment and Location Management for UAVs in Mission-critical Flying Ad Hoc Networks
Do-Yup Kim and Jang-Won Lee (Yonsei University, Korea)

III-1.3 Pseudo Range Estimation Model Based on Receieved GPS Signal Power in Many Skyscrapers Environments
Toshinari Hayakawa, Norifumi Murai and Takatoshi Sugiyama (Kogakuin University, Japan)

III-1.4 3-D Modeling and Analysis of Blockage Effects on the Performance of Urban Wireless Communication Systems
Soumaya Bachtobji (National Engineering School of Tunis, Tunisia); Kais Hassan (Université du Maine, France); Aymen Omri (Texas A&M University at Qatar, Qatar); Kosai Raoof (Laboratoire LAUM, France); Ridha R. Bouallegue (Ecole Supérieure des Communications de Tunis, Tunisia)

III-1.5 LCP for Managing Smart Greenhouse
Juyoung Park, Wook Hyun and Miyoung Huh (ETRI, Korea)

[Session III-2] Vehicular Information and Communication Technologies 1

Oct. 18, 08:30-10:10

Chair: Prof. Thabet Kacem (University of the District of Columbia, USA)

III-2.1 DOA estimation in Cyclic Prefix OFDM Systems in LOS mmWave Channel using Monopulse Ratio
Hoil Kim, Jonghyun Kim, Kwang Hoon Lee and Kwang Soon Kim (Yonsei University, Korea)

III-2.2 Spectral Leakage Reduction of Power-Delay-Doppler Profile for mm-Wave V2I Channel
Kyung-Won Kim, Jae-Joon Park, Myung-Don Kim and Juyul Lee (ETRI, Korea)

III-2.3 Design and Performance Analysis of Vehicle MIMO System for NR-based enhanced V2X
Sangmi Moon (Oregon State University, USA); Intae Hwang (Chonnam National University, Korea)

III-2.4 Performance Evaluation of Different Fading Channels in Vehicular Ad Hoc Networks
Fantian Zeng, Chunxiao Li and Haitao Wang (Yangzhou University, P.R. China)

III-2.5 Success Probability And Area Spectral Efficiency In Cellular Networks
Haitao Wang, Chunxiao Li, Fantian Zeng and Anran Zhen (Yangzhou University, P.R. China); Wasinee Noonpakdee (Thammasat University, Thailand)

Technical Paper Sessions

[Session III-3] 5G, 4G, LTE, LTE-Advanced, WLAN, WPAN, WBAN 2

Oct. 18, 08:30-10:10

Chair: Dr. Teerapat Sanguankotchakorn (Asian Institute of Technology, Thailand)

III-3.1 Full Duplex-Aware Backoff for Improving Channel Utilization in Full Duplex WLANs
Wonjung Kim, Tae-Yoon Kim, Sohyun Joo and Sangheon Pack (Korea University, Korea)

III-3.2 Interference Analysis of Joint-Spatial-Division and Reuse method for Next-Generation WLAN System
Xi Lei Chen, Jung Seop Lee and Kwang Soon Kim (Yonsei University, Korea)

III-3.3 Cell Selection Method of Co-Channel Deployment in Heterogeneous LTE-Advanced Network
Teerapat Sanguankotchakorn and Hettipathirannehelage Hettipathirana (Asian Institute of Technology, Thailand)

III-3.4 Characteristic of HPA Nonlinear Distortion Effects in MIMO-GFDM Systems
Ari Endang Jayati (Institut Teknologi Sepuluh Nopember & Universitas Semarang, Indonesia); Wirawan Wirawan and Titiek Suryani (Institut Teknologi Sepuluh Nopember, Indonesia); E Endroyono (ITS & Institut Teknologi Sepuluh Nopember, Indonesia)

III-3.5 Latency Analysis of UAV based Communication Networks
Mouayad Horani and Mazen Omar Hasna (Qatar University, Qatar)

[Session III-4] SDN and Network Virtualization

Oct. 18, 08:30-10:10

Chair: Prof. Yong Jin (Tokyo Institute of Technology, Japan)

III-4.1 Design of SFC Management System based on SDN and NFV
Li-Der Chou, Chia-Wei Tseng and Shun-Yu Xie (National Central University, Taiwan); Chen Pin-Hao (National Kaohsiung Normal University, Taiwan); Yu-zhe Lee (National Central University, Taiwan); Chia-Kuan Yen, Wei-Hsiang Tsai and Sen Su (National Chung-Shan Institute of Science and Technology, Taiwan)

III-4.2 Fast Failure Recovery for In-Band Controlled Multi-Controller OpenFlow Networks
Kwan-Yee Chan, Chen Hua Chen, Yi-Huei Chen, Yun-Ju Tsai, Steven S. W. Lee and Cheng-Shong Wu (National Chung-Cheng University, Taiwan)

III-4.3 Application of TCP Multi-Pathization Method with SDN by IoT Devices to Web Service
Yuki Yoshida (Nagoya Institute of Technology & Yoshihiro Ito Labo, Japan); Yoshihiro Ito (Nagoya Institute of Technology, Japan)

III-4.4 Evaluating Software-Defined Networking-Driven Edge Clouds for 5G Critical Communications
Fabian Kurtz, Igor Laukhin, Caner Bektas and Christian Wietfeld (TU Dortmund University, Germany)

III-4.5 Good for One? Good for All!: Strategic Value of the Mobile Virtual Network Operator Owned by Host Mobile Network Operator
Yeon-Jin Park (ETRI, Korea); Se-Youn Jung (Korea National Open University, Korea)

Technical Paper Sessions

[Workshop III-1] Advances in Convergence of ICT and Brain Science for better health Workshop 1

Oct. 18, 08:30-10:10

Chair: Youngho Lee (Gachon University)

W-III-1.1 Convolutional Neural Network Algorithm with Parameterized Activation Function for Melanoma Classification
Abdulaziz Namozov and Young Im Cho (Gachon University, Korea)

W-III-1.2 The effect of binaural beat-based audiovisual stimulation on brain waves and concentration
Jinhyeok Park (Gachon University, Korea)

W-III-1.3 An authentication protocol for smartphone integrated Ambient Assisted Living system
Mirjalol Salimov (Gachon University, Korea)

W-III-1.4 Study on detect stroke symptoms using face features
Umirzakova Sabina (Gachon University, Korea)

W-III-1.5 Building Cost-effective Model For Predicting β-Amyloid Burden by Combination of Cortical Thickness, Volume, and Neuropsychological Assessment Measures
Hyunwoong Ko, Taehyeong Kim, Jung-Joon Ihm and Hong-Gee Kim (Seoul National University, Korea)

[Workshop III-2] Emerging Solutions for 5G and Beyond 5G Workshop 1

Oct. 18, 08:30-10:10

Chair: Chuan Heng Foh (University of Surrey, 5G Innovation Centre)

W-III-2.1 Generalized SER Analysis of OFDM Index Modulation for Vehicular D2D Environments
Eleftherios Chatziantoniou (Metaboards, United Kingdom (Great Britain)); Youngwook Ko (Queen's University Belfast, United Kingdom (Great Britain))

W-III-2.2 Cell Coverage Degradation Detection Using Deep Learning Techniques
David Mulvey and Chuan Heng Foh (University of Surrey, United Kingdom (Great Britain)); Muhammad Ali Imran (University of Glasgow, United Kingdom (Great Britain)); Rahim Tafazolli (University of Surrey, United Kingdom (Great Britain))

W-III-2.3 Exploiting The Capacity-Routing Ability Of a Cloud Radio Access Network
Muhammad Khan (Brunel University, United Kingdom (Great Britain))

W-III-2.4 Outage Analysis of Distributed Buffering Multi-Relay Selection for Cooperative Networks
Lu Ge (Tsinghua University, P.R. China); Gaojie Chen (University of Leicester, United Kingdom (Great Britain)); Yu Gong (Loughborough University, United Kingdom (Great Britain)); Wang Jing (Tsinghua University, P.R. China); Yue Zhang (University of Leicester, United Kingdom (Great Britain)); Jonathon Chambers (University of Leicester, United Kingdom (Great Britain))

Technical Paper Sessions

[Session P-2] Poster Session 2

Oct. 18, 08:30-10:10

Chair: Prof. Attahiru Alfa (University of Manitoba, Canada)

P-2.1 **Improved RSS-based Localization Using Linear Regression Approach in UWSNs**
Thu L. N. Nguyen and Yoan Shin (Soongsil University, Korea)

P-2.2 **Ripple Window OFDM (RW-OFDM) System for Improvement of Spectrum Resource Utilization**
Changyoung An, Dayoung Kim and Heung-Gyoon Ryu (Chungbuk National University, Korea)

P-2.3 **Analysis of Dual Connectivity Gain in Terms of Delay and Throughput**
Seongjoon Kang and Saewoong Bahk (Seoul National University, Korea)

P-2.4 **Boosting the Performance of Nested Spatial Mapping with Unequal Modulation in 802.11n**
Ealwan Lee (GCT Semiconductor, Inc., Korea)

P-2.5 **Error Performances for a 12.QAM STBC with Two-Space Dimensions**
Hae Chung, Hyunhwa Lee and Jihoon Lee (Kumoh National Institute of Technology, Korea)

P-2.6 **Collaboration of Call Admission Control with Load-balancing in Small-cell Networks**
Md Mehedi Hasan and Sungoh Kwon (University of Ulsan, Korea); Sung Kyung Kim (ETRI, Korea)

P-2.7 **Bayesian Deep Learning-based Confidence-aware Solar Irradiance Forecasting System**
HyunYong Lee and Byung Tak Lee (ETRI, Korea)

P-2.8 **Distributed Deep Learning Framework based on Shared Memory for Fast Deep Neural Network Training**
Eun-Ji Lim, Shinyoung Ahn, Wan Choi and Yoo-mi Park (ETRI, Korea)

P-2.9 **Sequence-to-Sequence model for Building Energy Consumption Prediction**
Marie Kim (ETRI, Korea)

P-2.10 **Ensemble Classifier based on Decision-Fusion of Multiple Models for Speech Emotion Recognition**
Kyoung-Ju Noh (ETRI, Korea)

P-2.11 **Driver Drowsiness Detection based on Multimodal using Fusion of Visual-feature and Bio-signal**
HyungTak Choi, Moonki Back and Kyu-Chul Lee (Changnam National University, Korea)

P-2.12 **Clustering Player Behavioral Data and Improving Performance of Churn Prediction from Mobile Game**
Hyoungjin Kwon (ETRI, Korea); Wooyoung Jeong (Hongik University, Korea); Dae-Wook Kim and Seong-Il Yang (ETRI, Korea)

P-2.13 **Oversampling for Imbalanced Data Classification Using Adversarial Network**
Sang-Kwang Lee (ETRI, Korea); Seung-Jin Hong (Hongik University, Korea); Seong-Il Yang (ETRI, Korea)

P-2.14 **Automatic Bird-Species Recognition using the Deep Learning and Web Data Mining**
Kang Min-Seok and Kwang-Seok Hong (Sungkyunkwan University, Korea)

P-2.15 **Performance Study of Distributed Big Data Analysis in YARN Cluster**
HooYoung Ahn, Hyunjae Kim and Woongshik You (ETRI, Korea)

P-2.16 **High-Speed Signal Integrity Design for HDCA Systems**
Wonok Kwon and Young Woo Kim (ETRI, Korea)

P-2.17 **An Implementation of Location Trajectory Data Reduction**
Sungwon Byon, Eunjung Kwon, Eui-Suk Jung and Yong-Tae Lee (ETRI, Korea)

P-2.18 **A Study of Design with Spatial Rule-Based Engine Using GeoSpatial Big-Data**
Sangsu Kim, Kwaun-Sik Song and Junhee Go (ICTWAY, Korea)

Technical Paper Sessions

P-2.19 **Performance Analysis of a Novel DTN Routing Protocol for ICN in Disaster Environments**
Min Wook Kang and Yun Won Chun g (Soongsil University, Korea)

P-2.20 **Toward future networks for the thing-user centric communication**
Seong-Soon Joo, Nae-Soo Kim and Cheol Sig Pyo (ETRI, Korea)

P-2.21 **Realizing Source Location Privacy in Wireless Sensor Networks Through Agent Node Routing**
Lilian Mutalemwa and Seokjoo Shin (Chosun University, Korea)

P-2.22 **Network Usage of Bitcoin Full Node**
Lee Kiyoung, Hyeonwoo Kim, Essaid Maryam, Wooguil Pak, Hong Taek Ju and Park Sejin (Keimyung University, Korea)

P-2.23 **Implementation of TLS and DTLS on Zephyr OS for IoT Devices**
Yun-kyung Lee (ETRI, Korea)

P-2.24 **A Study of Template Clustering in the Side Channel Template Analysis**
Taesung Kim (ETRI, Korea)

P-2.25 **Similarity Hash Index**
Sunoh Choi, Youngsoo Kim and Jonghyun Kim (ETRI, Korea)

P-2.26 **A Tesbed for Experimenting IoT Platform on High-Voltage Customer Electrical Installation**
Hyunjoo Kang, Yoon-Young An, Sung Hei Kim, Sangjin Jeong and Taehyoung Shim (ETRI, Korea)

P-2.27 **A Study on the Implementation of Economic Zero Energy Building according to Korea's Renewable Energy Support Policies and Energy Consumption Patterns**
Cheol-Ho Shin (ETRI, Korea)

P-2.28 **Very Short-Term Photovoltaic Power Generation Forecasting with Convolutional Neural Networks**
Dohyun Kim (Chung-Ang University, Korea); Sung-Wook Hwang (Korea Electric Power Corporation (KEPCO) Research Institute, Korea); Joongheon Kim (Chung-Ang University, Korea)

P-2.29 **Development of a Design and Value Evaluation Tool for the Optimal Connection between Renewable Energy Generation and Energy Storage System**
Jong-Won Kim, Chang-Sic Choi and Wan-Ki Park (ETRI, Korea)

P-2.30 **RNN-Based Node Selection for Sensor Networks with Energy Harvesting**
Myeung Un Kim and Hyun Jong Yang (UNIST, Korea)

P-2.31 **Energy-Efficiency Optimization for WSNs Using Distributed Power Splitting at Receiver**
Zaki Masood (Chonnam National University, Korea)

P-2.32 **Efficient Radiomap Management for WLAN based Positioning System**
Jinwoo Kim (Samsung, Korea)

P-2.33 **Survey of Inertial/magnetic Sensors Based pedestrian dead reckoning by multi-sensor fusion method**
Feyissa Woyano (Korean University of Science and Technology (UST) & ETRI, Korea)

P-2.34 **The Method of Clustering Network Traffic Classifications for Extracting Payload Signature by Function**
Kyu-Seok Shim, Young-Hoon Goo, Min-Seob Lee, Huru Hasanova and Myung-Sup Kim (Korea University, Korea)

P-2.35 **Spectrally Efficient Orthogonal Frequency Division Multiplexing with Cyclic Prefix and Postfix, and Pilots**
Myungsup Kim (KAIST, Korea)

P-2.36 **link budget analysis of DSRC system using pathloss model for multiple vehicle nodes**
Yoo-seung Song, Shin-Kyung Lee and Jeong-Woo Lee (ETRI, Korea)

Technical Paper Sessions

P-2.37 Feature-based Transportation Sentiment Analysis Using Fuzzy Ontology and SentiWordNet
Farman Ali and Shaker El-Sappagh (Inha University, Korea); Pervez Khan (University of Malakand, Pakistan); Kyung Sup Kwak (Inha University, Korea)

P-2.38 Reliability Verification Procedure of Secured V2X Communication for Autonomous Cooperation Driving
Han-Gyun Jung, Dae Kyo Shin, Sang Hun Yoon, Seong-Keun Jin, Soo Hyun Jang and Ki-Taeg Lim (Korea Electronics Technology Institute, Korea); Jaemin Kwak (Mokpo National Maritime University, Korea)

P-2.39 Structure of Enhanced QoS for Vehicular Network
Shin-Kyung Lee (Etri, Korea)

P-2.40 Take-over performance analysis depending on the drivers' non-driving secondary tasks in automated vehicles
Jungsook Kim (ETRI, Korea)

P-2.41 IoTivity-Lite: Comprehensive IoT Solution In A Constrained Memory Device
Jaehong Jo, Jaehyun Cho and Rami Jung (Samsung Electronics, Korea); Hanna Cha (Samsung Research, Korea)

P-2.42 Interference Analysis of Guardband NB-IoT System
Hyungjin Kim, Seong Chul Cho and Youngha Lee (ETRI, Korea)

P-2.43 Experiments of a LPWAN tracking(TR) platform based on sigfox test network
Yeonjoon Chung, Jae Young Ahn and Jae-doo Huh (ETRI, Korea)

P-2.44 Driver Reaction Acceptance and Evaluation to Abnormal Driving Situations
Kwangsoo Kim and Bong Wan Kim (ETRI, Korea); Jun Wook Lee (Handysoft Inc., Korea); Dong-Hwan Park (ETRI, Korea)

P-2.45 Light-Weight Service Lifecycle Management For Edge Devices In I-IoT Domain
Hyuna Jo, Jihun Ha and MyeongGi Jeong (Samsung Electronics, Korea)

P-2.46 A Scheduling Algorithm for Improving Scalability of LoRaWAN
Junhee Lee (University of Science and Technology, Korea); Wun-cheol Jeong and Byeong-cheol Choi (ETRI, Korea)

P-2.47 SLICE-based Trustworthiness Analysis System
Kang-Woon Hong and Dong-Hwan Park (ETRI, Korea)

P-2.48 Combining Reward Shaping and Curriculum Learning for Training Agents with High Dimensional Continuous Action Spaces
SooYoung Jang and Mi-Kyung Han (ETRI, Korea)

P-2.49 An Integrated Management System for Aids to Navigation
Seong Chul Cho, Hyungjin Kim and Youngha Lee (ETRI, Korea)

P-2.50 A Study on the Method to Extract Clear Fields From the Private Protocol
Min-Seob Lee, Kyu-Seok Shim, Young-Hoon Goo and Myung-Sup Kim (Korea University, Korea)

P-2.51 Money Laundering in the Bitcoin Network: Perspective of Mixing Services
Junwoo Seo and Mookyu Park (Korea University, Korea); Haeng Rok Oh (Agency for Defence Development, Korea); Kyungho Lee (Korea University, Korea)

P-2.52 An OpenCL-based SIFT Accelerator for Image Features Extraction on FPGA in Mobile Edge Computing Environment
Canh Duc Le, EunYoung Oh, JaeHo Jeong, Sunghyun Kim, Minsu Jeon and Chan-Hyun Youn (Korea Advanced Institute of Science and Technology, Korea)

P-2.53 Towards a Sustainable Open Platform for Location Intelligence and Convergence
Eunyoung Cho (ETRI, Korea)

Technical Paper Sessions

P-2.54 Cloud-Edge Collaboration Framework for IoT data analytics
Jaewon Moon and Seung Woo Kum (Korea Elecronics Technology Institute, Korea); Sangwon Lee (Sungkyunkwan University); Sangyeon Cho (KETI, Korea)

P-2.55 Objectivity based Self-Evolving Agent Model Validation for Social Issue Simulation
JoonYoung Jung, Bae Jang Won, Chunhee Lee, Dong-oh Kang and Eui-Hyun Paik (ETRI, Korea)

P-2.56 Design of Robot based Work Progress Monitoring System for the Building Construction Site
Joa Hyoung Lee, Jung-Ho Park and Byung-Tae Jang (ETRI, Korea)

P-2.57 A study on Improvement of Resource Efficiency for IoT-based Pipe Leak Detection
Se Won Oh, Ji-Hoon Bae, Doo-Byung Yoon, Bongsu Yang and Gwan Joong Kim (ETRI, Korea); Hyeon Soo Kim (ChungNam National University, Korea)

P-2.58 Developing safety checklists for predicting accidents
Youhee Choi, Jeong-Ho Park and Byungtae Jang (ETRI, Korea)

P-2.59 Reptor: A Model for Deriving Trust and Reputation on Blockchain-based Electronic Payment System
Jaehong Ahn, Mingyu Park and Jeongyeup Paek (Chung-Ang University, Korea)

P-2.60 A development of a speech data transcription tool for building a spoken corpus
Yeonguk Yu and Hyangrae Noh (Hanbat National University, Korea); Jaeeun Park, Yunsoo Kim and Yongjin KwaK (IIR TECH Inc, Korea); Yoonjoong Kim (Hanbat National University, Korea)

P-2.61 Pupil Detection and Its Tracking Based on Optokinetic Reflex Motion
Kwang-Yong Kim, JungWoo Park and Kibong Song (ETRI, Korea)

P-2.62 3D Articulated Human Motion Analysis System Using a Single Low-cost RGB-D Sensor
Jongsung Kim and Myunggyu Kim (ETRI, Korea)

P-2.63 Conceptual Verification of Multi-Level Visibility Points for SmartX MultiView Security
Jun-Sik Shin, Muhammad Usman and JongWon Kim (Gwangju Institute of Science and Technology, Korea)

P-2.64 Research on the impact of technology taxonomy for the tracking of technology convergence
Heongu Lee (Office of Strategic R&D Planning, Korea)

P-2.65 A Study of Blockchain based on Graph Database for Software Quality Improvement
Dongho Kim and Hyewon Kim (Graphblockchain ltd., Korea)

P-2.66 Smart Livestock Farms Using Digital Twin: Feasibility Study
Seng-Kyoun Jo, Daeheon Park, Hyeon Park and Se-han Kim (ETRI, Korea)

P-2.67 Tile Visibility Index
JaeJun Yoo and Insung Jang (ETRI, Korea)

P-2.68 Construction and utilization of image database for image attribute structuring
Weon-Geun OH and Seungjae Lee (ETRI, Korea)

P-2.69 Hazing Based on a Physical Modeling and Improved Image Visibility Restoration Algorithm
DongWan Ryoo (ETRI, Korea)

P-2.70 Pedestrian Video Data Abstraction and Classification for Surveillance System
Ho Chul Shin and Jae-Yeong Lee (ETRI, Korea)

P-2.71 Soft assignment and multiple keypoint analysis-based pedestrian counting method
Chi Yoon Jeong, Moo-seop Kim and Hyung-Cheol Shin (ETRI, Korea)

P-2.72 Activity Recognition using Fully Convolutional Network from Smartphone Accelerometer
Moo-seop Kim (ETRI, Korea)

Technical Paper Sessions

P-2.73 Optimization of the effect of radiation on ASIC chip through detector
Hojong Chang, Byunghun Han and Gyuseong Cho (KAIST, Korea); Yongho Kim (CNFrontier, Korea); Woosook Jeon and Hyunduk Kim (KAIST, Korea)

P-2.74 Robust H_2 state estimation for discrete-time descriptor systems
Dongyeop Kang, Song Li and Heamin Lee (ETRI, Korea)

P-2.75 3D Mesh Reconstruction from Height map and Post Processing
Yun ji Ban, Hye-Sun Kim and Chang Joon Park (ETRI, Korea)

P-2.76 The Overview of Smart City Convergence Service Platform
Eunjin Ko and Mi-Kyung Han (ETRI, Korea)

P-2.77 Sensory Effect Authoring Tool for Virtual Reality Simulation
Noh-sam Park and Mi-Kyung Han (ETRI, Korea)

P-2.78 HaaS(Human Activity Analytics as a Service) Using Sensor Data of Smart Devices
Eunjung Kwon, Hyunho Park, Sungwon Byon, Eui-Suk Jung and Yong-Tae Lee (ETRI, Korea)

P-2.79 Frequency-Aware Attention based LSTM Networks for Cardiovascular Disease
Hwin Dol Park (ETRI, Korea)

P-2.80 Effectiveness Analysis of Warning Service using V2X Communication Technology at Intersection
Jeong-Woo Lee and Shin-Kyung Lee (Etri, Korea); Hyun Mi Lee (TOD-based Engineering Research Center, Korea); Jeong Ah Jang (Ajou University & Transportation Oriened Development, Korea); Hyun Seo Oh (ETRI, Korea)

P-2.81 On-road Reconfigurable Instrument Cluster Concept and Contexts of Application
Ju Il Jeon, Jin-Kyu Choi, YoungJin Kwon, Kyongho Kim, Hyun-Kyun Choi and Byung-Tae Jang (ETRI, Korea)

P-2.82 Study on Crammer-Rao Lower Bound of Angle-of-Arrival Position Estimation for Cooperative Vehicle-to-vehicle (V2V) Communication
JinSoo Youn, Joohyun Jo and Dong Ku Kim (Yonsei University, Korea)

P-2.83 Wideband Transmission for Unmanned Aircraft Systems
Kwangjae Lim, Hee Wook Kim, Tae Chul Hong and Jae Young Ahn (ETRI, Korea)

P-2.84 Interpolation Error Compensation for Look-up Table Based PMSM Control for Electric Vehicle
Jung-Hyo Lee (Kunsan National University, Korea)

P-2.85 Optimal MTU Selection for Maximizing Goodput in Wireless Networks
SooYoung Jang and Mi-Kyung Han (ETRI, Korea)

P-2.86 Design of a Transmitting Coil for Effective Charging Area Expansion Using a Stepped Helical Coil
Sang-Won Kim, Jung Ick Moon, Seong-Min Kim, In-Kui Cho and Soo-Ho Sohn (ETRI, Korea)

P-2.87 An Implementation of Power Amplifier for CMOS Crystal-less Wireless Connectivity
Suk-hui Lee, Chung-geun Jang, Ki-Jin Kim and Kwang-Ho Ahn (Korea Electronics Technology Institute, Korea); Sung-il Bang (Department of Electronics and Electric Engineering, Korea)

P-2.88 Study on Air-to-Ground multipath channel and mobility influences in UAV based broadcasting
Jae-Hwui Bae, YoungSu Kim, Namho Hur and Heung Mook Kim (ETRI, Korea)

P-2.89 Interference Measurement Between 3.5 GHz 5G System And Radar
Heon-Jin Hong, Sung Woong Choi, Chung Sup Kim and Young Jun Chong (ETRI, Korea)

P-2.90 The Study of PSi & PSo Algorithm for Reducing Power of the Mobile Communication Network
Jongsin Kim, Choi Yonggil and OH Younghoon (SK Telecom, Korea)

Technical Paper Sessions

P-2.91 **Non-stationarity of vehicle-to-vehicle channels using correlation matrix distance in highway scenarios**
Ju Yeon Hong (ETRI, Korea)

P-2.92 **Dynamic Load Balancing Mechanism in Mobile Gateway with Heterogeneous Network**
Taeheum Na, Ho Yong Ryu and Tae-Yeon Kim (ETRI, Korea); Jaehyung Park (Chonnam National University, Korea); Sangjin Hong (Saint Leo University, USA); PyungKoo Park (ETRI, Korea)

P-2.93 **Smart Micro Energy Grid - Service, Solutions, and Business Models**
Daekyo Jung, Young-Myoung Kim and Youngeun Chang (Korea Telecom, Korea)

P-2.94 **A Method of Detection of respiration rate on Android using UWB Impulse Radar**
Young-Jin Park and Hui-Sup Cho (DGIST, Korea)

P-2.95 **Investigation on Overlapping Interference on VLC Networks Consisting of Multiple LEDs**
Nan Chi and Jianyang Shi (Fudan University, P.R. China)

P-2.96 **On the Throughput Gain of Device-to-device Communications**
YoungJu Hwang (Samsung Electronics, Korea); Jihong Park (University of Oulu, Finland); Ki Won Sung (KTH Royal Institute of Technology, Sweden); Seong-Lyun Kim (Yonsei University, Korea)

P-2.97 **A New SLM Scheme to Reduce the PAPR of OFDM Signals using Genetic Algorithm**
Insoo Sohn (Dongguk University, Korea)

P-2.98 **ATSC 3.0 Broadcast Gateway Virtualization System based on VNF**
Soon-Choul Kim (ETRI, Korea)

P-2.99 **A Multiple Hash Routing Scheme for Fast Data Retrieval in ICN**
Heeyoung Jung and Sunme Kim (ETRI, Korea)

P-2.100 **A maximum throughput channel allocation protocol in multi-channel multi-user cognitive radio network**
Shi Wang (University of Pretoria & LiaoNing Technical University, South Africa); Attahiru Alfa (University of Manitoba and University of Pretoria); Bodhaswar TJ Maharaj (University of Pretoria, South Africa)

[Session IV-1] Signal and Image Processing 1

Oct. 18, 10:30-12:10

Chair: Dr. Slamet Riyadi (Uiversitas Muhammadiyah Yogyakarta, Indonesia)

IV-1.1 **Impact of Mutual Coupling on Performance of DoA Estimation using MUSIC**
Jung-Bin Kim and Cheon-sig Shin (ETRI, Korea)

IV-1.2 **Edge-based Error Concealment for Line Compression Methods**
Ho-Young Kim (University of Kwangwoon, Korea); Seong-Won Lee (Kwangwoon University, USA)

IV-1.3 **Image Purification through Controllable Neural Style Transfer**
Tongtong Zhao, Yuxiao Yan, Ibrahim S Shehu, HaoHui Wei and Xianping FU (Dalian Maritime University, P.R. China)

IV-1.4 **Deep Inverse Tone Mapping Optimized for High Dynamic Range Display**
Katsuhiko Hirao, Zhengxue Cheng, Masaru Takeuchi and Jiro Katto (Waseda University, Japan)

IV-1.5 **Evaluation of Mangosteen Surface Quality using Discrete Curvelet Transform**
Slamet Riyadi, Jaenudin Jaenudin, Laila Ma'rifatul Azizah, Cahya Damarjati and Tony Hariadi (Universitas Muhammadiyah Yogyakarta, Indonesia)

Technical Paper Sessions

[Session IV-2] Artificial Intelligence and Machine Learning 2

Oct. 18, 10:30-12:10

Chair: Prof. Sanghyun Ahn (University of Seoul, Korea)

IV-2.1 Multi-stage image retrieval based on feature augmentation with truncated polynomial weight
Keundong Lee, Seungjae Lee and Wonyoung Yoo (ETRI, Korea)

IV-2.2 CNN based Sentence Classification with Semantic Features using Word Clustering
Hwa-Yeon Kim (University of Science and Technology, Korea); Jinsu Lee (University of Science and Technology & ETRI, Korea); Na Young Yeo and Marcella Astrid (University of Science and Technology, Indonesia); Seung-Ik Lee and Young-Kil Kim (ETRI, Korea)

IV-2.3 An Affect Detector Model For Gamers on a Role-Playing Game Through Mouse Movements
Mary Jane Samonte, Larry Vea, Arden John Lagoy, Antonio Martyn Perez, Charles Eugene Manlapid and Randall Mark San Jose (Mapua University, Philippines)

IV-2.4 Purchasing Process Analysis with Process Mining of a Heavy Manufacturing Industry
Hind R'bigui and Chiwoon Cho (University of Ulsan, Korea)

[Session IV-3] Advanced Communication Networks and Future Internet Technologies 1

Oct. 18, 10:30-12:10

Chair: Prof. Tokumi Yokohira (Okayama University, Japan)

IV-3.1 A Two-Step Server Selection in Hybrid CDN-P2P Mesh-based for Video-on-Demand Streaming
Arnon Saengarunwong and Teerapat Sanguankotchakorn (Asian Institute of Technology & School of Engineering and Technology, Thailand)

IV-3.2 A Data-centric Network Architecture for Service Optimization and Data Sharing
Sunme Kim, Sang Ki Kim and Sae Hyong Park (ETRI, Korea); Sang-Ha Kim (Chungnam National University, Korea)

IV-3.3 Channel Error Detection based Cluster Formation for Cooperative Spectrum Sensing
Dost Muhammad Bhatti (Dawood University of Engineering and Technology Karachi, Pakistan); Syed Bizzat Hussain Zaidi (DHA Suffa University Karachi, Pakistan); Shamim Ur Rehman Naich (Dawood University of Engineering and Technology Karachi, Pakistan)

IV-3.4 Backoff Algorithms to Avoid TCP Incast in Data Center Networks
Shigeyuki Osada (Japan Research Institute, Ltd., Japan); Daichi Izumi, Shiden Kishimoto, Yukinobu Fukushima and Tokumi Yokohira (Okayama University, Japan)

IV-3.5 The Effect of Using Attribute Information in Network Traffic Prediction with Deep Learning
Yusuke Tokuyama, Yukinobu Fukushima and Tokumi Yokohira (Okayama University, Japan)

IV-3.6 Maximizing Dense Network Flow through Wireless Multihop Backhauling using UAVs
Abdullateef Almohamad, Mazen Omar Hasna, Tamer Khattab and Mohamed Haouari (Qatar University, Qatar)

Technical Paper Sessions

[Workshop IV-1] Wearable Technologies for Smart Applications

Oct. 18, 10:30-12:10

Chair: ??????????? (????????)

W-IV-1.1 A Study on Cell-Type Classification using Gene-Expression Data: Maximum Likelihood Approach and Support Vector Machine
DongMug Kang, Seokhyun Yoon and Kyoungpil Ra (Dankook University, Korea)

W-IV-1.2 Optimal Low-power Workout State Classification for Multiple Configurations
Jongkuk Lim, Seungyeon Jin and Younggeun Choi (Dankook University, Korea)

W-IV-1.3 Mitigating Journaling Overhead via Atomic Write
Myunghoon Oh, Yongjae Choi and Jongmoo Choi (Dankook University, Korea)

W-IV-1.4 Development of IoT based smart signage platform
Sunghee Lee (ETRI, Korea)

W-IV-1.5 Personal Sensory VR interface Utilizing Wearable Technology
Jiyoung Kang, Junhee Lee and Seungyeon Jin (Dankook University, Korea)

W-IV-1.6 Palm glove: wearable glove based on palm-camera for thumb-to-finger tap recognition
Yang Dongseok (University of Dankook, Korea); Younggeun Choi (Dankook University, Korea)

W-IV-1.7 Design and Implementation of User Interface through Hand Movement Tracking and Gesture Recognition
JeongHoon Seong and Younggeun Choi (Dankook University, Korea)

[Workshop IV-2] Advances in Convergence of ICT and Brain Science for better health Workshop 2

Oct. 18, 10:30-12:10

Chair: ??????????? (????????)

W-IV-2.1 Reactive Server Interface Design for Real-Time Data Exchange in Multiple Data Source and Clients
Dongcheol Jeon, DaeHyung Lee and Hee Joung Hwang (Gachon University, Korea)

W-IV-2.2 Personal Identification by Convolutional Neural Network with ECG Signal
Jianbo Xu, Tianhui Li, Ying Chen and Wenxi Chen (University of Aizu, Japan)

W-IV-2.3 Evaluating a Deep-Learning System for Automatically Calculating the Stroke ASPECT Score
Su-min Jung (University of Gachon, Korea)

W-IV-2.4 Study on relieving VR contents user's fatigue degree using aroma by measuring EEG
Seok Hee Oh (Gachon University, Korea)

Technical Paper Sessions

[Workshop IV-3] Emerging Solutions for 5G and Beyond 5G Workshop 2

Oct. 18, 10:30-12:10

Chair: ??????????? (????????)

W-IV-3.1 Intelligent 5G Vehicular Networks: An Integration of DSRC and mmWave Communications
Zhengguo Sheng, Andreas Pressas, Victor Ocheri and Falah H. Ali (University of Sussex, United Kingdom (Great Britain)); Richard Rudd (Plum Consulting Ltd, United Kingdom (Great Britain)); Maziar Nekovee (University of Sussex, United Kingdom (Great Britain))

W-IV-3.2 An Energy Efficiency Evaluation Framework for Radio Access Networks
Hao Fu and Timothy O'Farrell (University of Sheffield, United Kingdom (Great Britain))

[Workshop IV-4] Intelligent Immersive Media Communications Workshop

Oct. 18, 10:30-12:10

Chair: Ryu, Eun-Seok (Gachon University, Korea)

W-IV-4.1 Bitrate Efficient 3DoF+ 360 Video View Synthesis for Immersive VR Video Streaming
JongBeom Jeong, Dongmin Jang, Jangwoo Son and Eun-Seok Ryu (Gachon University, Korea)

W-IV-4.2 MPEG-DASH SRD based 360 VR Tiled Streaming System for Foveated Rendering
HyunWook Kim, JinWook Yang, JaeYoung Yang, Jun-Hwan Jang and Woo Chool Park (Korea Electronics Technology Institute, Korea)

W-IV-4.3 Distributed Video Transcoding System for 8K 360° VR Tiled Streaming Service
Yonghwan Kim, Jingang Huh and Jinwoo Jeong (Korea Electronics Technology Institute, Korea)

W-IV-4.4 Motion-constrained AV1 Encoder for 360 VR Tiled Streaming
Ganzorig Gankhuyag, Jinwoo Jeong and Yonghwan Kim (Korea Electronics Technology Institute, Korea)

W-IV-4.5 Hypermedia Applications with Transcoding Robust Data Embedding Method
Min Woo Park (Samsung Research, Korea)

W-IV-4.6 Foveation in near-eye holographic display
Jisoo Hong (Korea Electronics Technology Institute, Korea)

Technical Paper Sessions

October 19th (Friday), 2017

[Session V-1] Innovations and Trends at Edges

Oct. 19, 08:30-10:10

Chair: Prof. Peter Peer (University of Ljubljana, Slovenia)

V-1.1 **CNN-Based Indoor Path Loss Modeling with Reconstruction of Input Images**
Hong Cheng, Hyukjoon Lee and Shengjie Ma (Kwangwoon University, Korea)

V-1.2 **Polar Modulation with CR Method for Optical Wireless Communication MIMO System**
Junghyun Kim, Kim Youngwoo and Moon Seongjae (Korea Photonics Technology Institute, Korea); Sung-Hoon Hong (Chonnam University, Korea)

V-1.3 **A Digital Respiratory Stethoscope Method using Skin Image**
Sunghyuck Kim and Kwang-Seok Hong (Sungkyunkwan University, Korea)

V-1.4 **A Novel Motion Artifact Detection Algorithm Based on Recurrence Plot Processing of Photoplethysmogram Signal**
Ki Chon (University of Connecticut, USA)

V-1.5 **High Accuracy Real Time Machine Vision for Diameter Measurement Using Simpson Algorithm**
Tony Hariadi, Slamet Riyadi, Hasan Zidni and Karisma Putra (Universitas Muhammadiyah Yogyakarta, Indonesia)

[Session V-2] Vehicular Information and Communication Technologies 2

Oct. 19, 08:30-10:10

Chair: Prof. Jung-Ryun Lee (Chung-Ang University, Korea)

V-2.1 **Robust Ego-motion Estimation and Map Matching Technique for Autonomous Vehicle Localization with High Definition Digital Map**
Seung-Jun Han, Jungyu Kang, Yongwoo Jo, Dongjin Lee and Jeong-Dan Choi (ETRI, Korea)

V-2.2 **Internet of Things Solution for Motorcycle Riders to Overcome Traffic Jam in Jakarta Using EBkSP**
Muhamad Asvial, M. Faridz Gita Pandoyo and Ajib S. Arifin (Universitas Indonesia, Indonesia)

V-2.3 **Performance Analysis for City, Highway, and Rural Area in Vehicle-to-Vehicle Network**
Mohammed Alabsi (Dongseo University, Korea); Ahmed Al-Absi (Kyungdong University, Korea); HoonJae Lee (Dongseo University, Korea)

V-2.4 **Utilization of V2X Communications for Vehicle Queue Length Estimation**
Sanghyun Ahn and Jonghwa Choi (University of Seoul, Korea)

Technical Paper Sessions

[Session V-3] Smart Cities

Oct. 19, 08:30-10:10

Chair: Dr. AMIR SINAEEPOURFARD (Norwegian University of Science and Technology (NTNU), Norway)

V-3.1 **Mouse Picking with Ray Casting for 3D Spatial Information Open-platform**
Ahyun Lee and Insung Jang (ETRI, Korea)

V-3.2 **Proposal of a consensus builder for environmental condition setting in spaces where people with various preferences coexist**
Yuya Tarutani (Osaka University, Japan)

V-3.3 **A Zero Emission Neighbourhoods Data Management Architecture for Smart City Scenarios: Discussions toward 6Vs challenges**
Amir Sinaeepourfard, John Krogstie, Sobah Abbas Petersen and Arild Gustavsen (Norwegian University of Science and Technology (NTNU), Norway)

V-3.4 **A Study on Aperiodic Auto-Correlation Properties of Concatenated Codes by Barker Sequences and NFSR Sequences**
Shota Matsuyuki and Akio Tsuneda (Kumamoto University, Japan)

[Session V-4] Advanced Communication Networks and Future Internet Technologies 2

Oct. 19, 08:30-10:10

Chair: ??????????? (????????)

V-4.1 **Resource Allocation for Time-Variant Channels in the Nano-communication Networks**
Li Feng and Kyung Sup Kwak (Inha University, Korea); Qinghai Yang (Xidian University, P.R. China)

V-4.2 **Dynamic Congestion Control Algorithm for Multipath Transport Protocols**
Tabassum Lubna, Imtiaz Mahmud and You-Ze Cho (Kyungpook National University, Korea)

V-4.3 **Study of a method of supporting IP routing for MPTCP by SDN**
Koki Izumi and Yoshihiro Ito (Nagoya Institute of Technology, Japan)

V-4.4 **Optimal Resource Allocation for Femtocells with Broadband Power Line Backhaul Constraint**
Qingyang Liu, Xueliang Wang, Dapeng Lin, Shuming Xu, Kang Wang and Lihua Li (China Gridcom Co., Ltd., P.R. China)

V-4.5 **An IoT Sensor Mote for Precision Agriculture with Several MAC Layer Protocols Support**
José Adriano, Yara Mendes and Guilherme Marcondes(National Institute of Telecommunications (INATEL), Brazil); Vasco Furtado (University of Fortaleza, Brazil); Joel J. P. C. Rodrigues (National Institute of Telecommunications (Inatel), Brazil & Instituto de Telecomunicações, Portugal)

Technical Paper Sessions

[Session V-5] Military and Defense Technologies

Oct. 19, 08:30-10:10

Chair: ????????? (????????)

V-5.1 A Stepwise Approach for Energy Efficient Trust Evaluation in Military IoT Networks
Lim Ji Hun, Dohyung Kim and Young-Bae Ko (Ajou University, Korea); Dabin Kim (Agency for Defense Development, Korea)

V-5.2 Beam Synthesis under Feasible Scenarios for Radar and Communications Combined Systems
HyeonHo Noh, JungEun Lee and Hyun Jong Yang (UNIST, Korea)

V-5.3 Performance Analysis of Beamforming for Radar and Communications Coexisting Systems
JungEun Lee, HyeonHo Noh and Hyun Jong Yang (UNIST, Korea)

V-5.4 The Method of Seed Based Grouping Malicious Traffic by Deep-Learning
Ui-Jun Baek, Jee Tae Park, Huru Hasanova and Myung-Sup Kim (Korea University, Korea)

[Workshop V-1] IoE Data Workshop 1

Oct. 19, 08:30-10:10

Chair: Yeong Min Jang (Kookmin University)

W-V-1.1 Analysis of power usage at household and proper energy management
Jangkyum Kim, Jaeseob Han, Nakyoung Kim, Minkyung Kim, Hyeonseok Seo and Jun Kyun Choi (KAIST, Korea)

W-V-1.2 Optical Wireless Hybrid Networks for 5G and Beyond Communications
Mostafa Zaman Chowdhury, Moh. Khalid Hasan, Md. Shahjalal, Md. Tanvir Hossan and Yeong Min Jang (Kookmin University, Korea)

W-V-1.3 Dynamic Access Control Scheme for IoT Devices using Blockchain
DongYeop Hwang, JungYong Choi and Ki-Hyung Kim (Ajou University, Korea)

W-V-1.4 Access Point Selection in Hybrid OCC/RF eHealth Architecture for Real-Time Remote Patient Monitoring
Moh. Khalid Hasan, Md. Shahjalal, Mostafa Zaman Chowdhury and Yeong Min Jang (Kookmin University, Korea)

[Workshop V-2] Quantum Information ITRC Track

Oct. 19, 08:30-10:10

Chair: Heo, Jun (Korea University, Korea)

W-V-2.1 Efficiently Encodable Multi-Edge Type LDPC Codes for Long-Distance Quantum Cryptography
Suhwang Jeong and Jeongseok Ha (KAIST, Korea)

W-V-2.2 Design of MEMS-based SiO2 Waveguides on Quartz Substrate for Evanescent Field-based Saturable Absorbers
Changhyun Jung, Ikjun Hong, Minjae Lee, Jinho Lee, Ju Han Lee and Dong-il Cho (Seoul National University, Korea)

W-V-2.3 Analysis of random number generated by quantum noise source and software entropy source
JongHyun Lee, Youngjin Seo and Jun Heo (Korea University, Korea)

Technical Paper Sessions

W-V-2.4 Photocurrent generation mechanism in GeS nanosheet phototransistor
Young-Sun Moon, Kook Jin Lee and Gyu Tae Kim (Korea Univ, Korea)

W-V-2.5 Single Trace Side Channel Analysis on Quantum Key Distribution
Suhri Kim, Sunghyun Jin, Yechan Lee, Byeonggyu Park, HanBit Kim and Seokhie Hong (Korea University, Korea)

W-V-2.6 Mixed Quantum State Dynamics Estimation with Artificial Neural Network
Changjun Kim, June-Koo Kevin Rhee, Woojun Lee and Jaewook Ahn (KAIST, Korea)

[Session VI-1] Systems, Services and Applications for ICT Convergence 2

Oct. 19, 10:30-12:10

Chair: ??????? (????????)

VI-1.1 A Positioning Accuracy Enhancement Method Based on Inter-Vehicular Communication and Self-Organizing Map
Shengjie Ma, Hyukjoon Lee and Hong Cheng (Kwangwoon University, Korea)

VI-1.2 Coverage Analysis of Cellular Network with Bidirectional Beamforming
Kumin Cho and Chung G. Kang (Korea University, Korea)

VI-1.3 Implementation of Voice Recognition and Synthesis Module in Moodle System
Chunxiang Chen, Yusuke Kawamura and Renfen Hou (Prefectural University of Hiroshima, Japan)

VI-1.4 An Emerging Interactive 3D Architectural Design Walkthrough System for Industrial Hotel Builders
Mary Jane Samonte, Brian Jumaquio, Odale Patrick Roxas, Jayward Tamares and Zeus Nisael Recio (Mapua University, Philippines)

[Session VI-2] Big Data and Smart Computing 2

Oct. 19, 10:30-12:10

Chair: Prof. Hayoung Oh (Ajou University, Korea)

VI-2.1 An Efficient Topology Refining Scheme for Apache Flink
Muhammad Hanif and Choonhwa Lee (Hanyang University, Korea)

VI-2.2 Machine Learning based Fast Reading Algorithm for Future ICT based Education
Hyonam Jeon, Hayoung Oh and Jaejun Lee (Ajou University, Korea)

VI-2.3 YouTube aware Personalized Ranking System for Future ICT Education
Jihyeon Lee and Hayoung Oh (Ajou University, Korea)

VI-2.4 Design and Interface Testing of Connected Data Architecture of DataLake
ByungRae Cha (GIST, Korea)

VI-2.5 Conditional Cash Transfer Data Analysis of the Philippines: An e-Government Data Visualization Tool
Mary Jane Samonte, Tristan Gabriel Bal, Zeus Nisael Recio and Randall Mark San Jose (Mapua University, Philippines)

Technical Paper Sessions

[Session VI-3] 5G, 4G, LTE, LTE-Advanced, WLAN, WPAN, WBAN 3

Oct. 19, 10:30-12:10

Chair: Dr. Charlie Shim (Kutztown University, USA)

VI-3.1 Antenna element pattern estimation based on array beam pattern
Lakju Sung, Sangmi Noh and Dong-Ho Cho (Korea Advanced Institute of Science and Technology, Korea)

VI-3.2 Waveform Design of DFT-Spread WR-OFDM System for the OOB and PAPR Reduction
Md. Najmul Hossain and Tetsuya Shimamura (Saitama University, Japan); Dayoung Kim and Heung-Gyoon Ryu (Chungbuk National University, Korea)

VI-3.3 A Strategy for Preserving Privacy in the CCN
Yeongkwun Kim (Western Illinois University, USA); Injoo Kim (East-West University, USA); Charlie Shim (Kutztown University of Pennsylvania, USA)

VI-3.4 A Distributed Remote Driver Selection for Cost Efficient and Safe Driver Handover
Ali Gohar, Ali Raza and Sanghwan Lee (Kookmin University, Korea)

VI-3.5 QoS guaranteed Small Cell ON/OFF Techniques Based on Deep learning
Tae-Yoon Park, Eung-Hyo Kim, Park Jaewan, Jong-Won Han and Een-Kee Hong (Kyunghee University, Korea); Soojung Jung and Taegyun Noh (ETRI, Korea)

[Session VI-4] Information & Communication Theory, and Their Applications 3

Oct. 19, 10:30-12:10

Chair: ???????? (?????????)

VI-4.1 Cluster Splitting through Small Cell ON/OFF in UDN Environment
Eung-Hyo Kim, Park Jaewan, Tae-Yoon Park, Jong-Won Han and Een-Kee Hong (Kyunghee University, Korea); Soojung Jung and Taegyun Noh (ETRI, Korea)

VI-4.2 Iterative Decoders for FTN-based NOMA Scheme to Multiplex Sporadic and Broadband Transmission
Ameha Abebe and Chung G. Kang (Korea University, Korea)

VI-4.3 Improvement of Extended Least Difference Greedy Clique-Cover Algorithm for Index Coding
Joon-Woo Lee, Jaewon Kim and Jong-Seon No (Seoul National University, Korea)

VI-4.4 Sliding Window Protocols with Rate Adaptation for FSO Burst Transmission over Turbulence Channels
Hoang Le (University of Aizu, Japan); Vuong V. Mai (KAIST, Korea); Chuyen T. Nguyen (Hanoi University of Science and Technology, Vietnam); Anh T. Pham (The University of Aizu, Japan)

VI-4.5 How mobile banking service quality influence customer satisfaction of generation x and y?
Rahmat Trialih (Brawijaya University, Indonesia); Saide Saide (Information System (PRO Knowledge Research), State Islamic University of Sultan Syarif Kasim Riau, Indonesia & Information Management, National Taiwan University of Science and Technology, Taiwan); Miftakhul Saputro (Brawijaya University, Indonesia); Arif Tirtana (STIKI, Indonesia); Yudha Aprilian (Brawijaya University, Indonesia)

Technical Paper Sessions

[Session VI-5] Encryption and Security for ICT Convergence

Oct. 19, 10:30-12:10

Chair: Prof. Akio Tsuneda (Kumamoto University, Japan)

VI-5.1 Secure Key Extraction for IoT Devices Integrating IEEE 802.15.4g/k Transceiver
Mi-kyung Oh, Sangjae Lee, Yousung Kang and Dooho Choi (ETRI, Korea)

VI-5.2 Non-Repudiable Dynamic PDP with Stronger Security based on Stateful Rank Based Skip List
Minseok Lee (University of Science and Technology, Korea)

VI-5.3 Study on Security Enhancement of 64.Bit NFSR-based Block Cipher Systems with Ring Structure
Toshihiro Ichiki and Akio Tsuneda (Kumamoto University, Japan)

VI-5.4 Implementing a phase detection ring oscillator PUF on FPGA
Sangjae Lee, Mi-kyung Oh, Yousung Kang and Dooho Choi (ETRI, Korea)

[Workshop VI-1] IoE Data Workshop 2

Oct. 19, 10:30-12:10

Chair: Mostafa Zaman Chowdhury(Kookmin University)

W-VI-1.1 A Generalized SDN Framework for Optical Wireless Communication Networks
Md. Shahjalal, Mostafa Zaman Chowdhury, Moh. Khalid Hasan, Md. Tanvir Hossan and Yeong Min Jang (Kookmin University, Korea)

W-VI-1.2 An Overview of Internet of Energy (IoE) Based Building Energy Management System
Van Thang Nguyen, Thanh Luan Vu, Nam Tuan Le and Yeong Min Jang (Kookmin University, Korea)

Registration

- Author Registration Deadline : September 15, 2018
- Early Registration Deadline: October 7, 2018

Registration Policy

1. To be published in the ICTC 2018 Conference Proceedings, a minimum of one author from each accepted paper MUST register at the Regular registration fee (member or non-member) and the paper must be presented at the conference.
2. "Member" rates apply to members of IEEE (Institute of Electrical and Electronics Engineers), IEICE (The Institute of Electronics, Information and Communication Engineers), KICS (Korea Institute of Communications and Information Science), and CIC (China Institute of Communications).
3. A valid student ID is required at the registration desk to check the eligibility for student-rate registration.
4. ALL registrations include access to all conference sessions (paper, plenary, industrial, special, technical, and workshop), conference proceedings (contained in USB memory) and coffee breaks, luncheon, and a ticket for banquet
5. Non-refundable author registration fees must be paid prior to the early registration due (September 1, 2018).
6. For non-author registrations, absolutely no cancellations/refunds will be accepted after September 21, 2018.

Registration Fee

		Member / Non-member	
		US $ (International)	KRW (₩) *
Regular	Early Birds	$600 / $660	₩600,000 / ₩660,000
	On-Site	$660 / $770	₩660,000 / ₩770,000
Student**	Early Birds	$369 / $451	₩396,000 / ₩451,000
	On-Site	$451 / $506	₩451,000 / ₩506,000

* US $ 1 = ₩1,000 (Round down less than one hundred won)

** Student : Student who do not present a paper

Contact Information

If you have any questions, please contact Registration Secretariat of ICTC 2018 at ictc@kics.or.kr

- Tel: +82-2-3453-5555
- Fax: +82-2-539-5588

Venue

Maison Glad Jeju

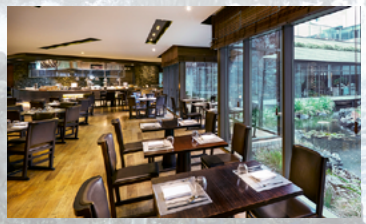
Web Site: https://ora.oraresort.com/eng/GRD/

JEJU GRAND HOTEL with 38years of history is just reborn as MAISON GLAD after completion of a year of renovation. The newly renovated hotel is reborn with modern facilities and new programs, at the same time, it still maintain its original heritage story. It is the second chain hotel of "GLAD Hotel Group" under "DAELIM Hotel brand" following the GLAD Hotel, Yeouido. The "GLAD Hotel Group brand" pursuits practicalities in many areas such as Spaces, Designs, Service, etc. It keeps put efforts to harmonize between local attractive features and brand for the successful brand building. The brand hotel is planning to build its new hotels more in lots of cities.

Maison Glad Jeju

Address: 80, Noyeon-ro, Jeju-si, Jeju-do, Korea

TEL. +82-64-747-5000 | FAX. +82-64-742-3150 | E-mail : reserve@oraresort.com



Transportation to and from Hotel

1. Jeju International Airport → MAISON GLAD JEJU

- Airport → Hotel: 8:30AM – 7:30PM (10 times a day, every hour/service limited at 12:30PM & 17:30PM)
- Hotel → Airport: 8:00AM – 7:00PM (10 times a day, every hour / service limited at 12:00PM & 17:00PM)
- Total distance : 3.5km | Time required : Within 10minute

2. JEJU INTERNATIONAL AIRPORT → MAISON GLAD JEJU

Shutter Bus

- 2018.6.1 ~ 11.30
- Hop on the hotel shuttle bus at the parking lot C-10 to reach Maison Glad Jeju.

*Airport → Hotel: 8:30AM – 7:30PM (10 times a day, every hour/service limited at 12:30PM & 17:30PM)

3. MAISON GLAD JEJU → JEJU INTERNATIONAL AIRPORT

Shutter Bus

- 2018.6.1 ~ 11.30
- Hotel → Airport: 8:00AM – 7:00PM (10 times a day, every hour / service limited at 12:00PM & 17:00PM)

4. HOTEL ↔ JEJU AIRPORT REGULAR SHUTTLE BUS

HOTEL DEPARTURE	AIRPORT DEPARTURE	
08:00	08:30	AIRPORT DEPARTURE C-10 PARKING LOT
09:00	09:30	
10:00	10:30	
11:00	11:30	
13:00	13:30	
14:00	14:30	
15:00	15:30	
16:00	16:30	
18:00	18:30	
19:00	19:30	
20:00	20:30	

Travel Information

Hallasan National Park

Hallasan stands out at the center of South Korea's southernmost island, boasting exquisite landscapes due to its varied volcanic topography and vegetation distribution ranging vertically through the subtropical, temperate, frigid and alpine zones. The special nature of this area led to its being designated and managed as a national park in 1970, a UNESCO Biosphere Reserve in 2002, a World Natural Heritage Site in 2007. Muljangori Oreum registered as a Ramsar Wetland in 2008.

Jeju Olle

"Olle" [Ole] is the Jeju word for a narrow pathway that is connected from the street to the front gate of a house. Hence, "Olle" is a path that comes out from a secret room to an open space and a gateway to the world. If the road is connected, it is linked to the whole island and the rest of the world as well. It has the same sound as "Would you come?" in Korean, so Jeju's "Olle" sounds the same as 'Would you come to Jeju?'. The first trail route was opened to the public in September, 2007. Since then, the Jeju Olle exploration team has created a combined total of 200km of walking trails in Jeju island. Currently eleven trail routes have been opened to walkers and the trail exploration team is still working on new routes.

Udo (Cow Islet)

The island was named "Udo" or "Cow Island" as its contours look like a cow lying down on the ground. There are 8 scenic wonders of Udo: day and night(Judan-myeongwol and Yahang-eobeom), sky and earth (Cheonjin-gwansan and Jidu-cheongsa), front and back (Jeonpo-mangdo and Huhae-seokbyeok), and east and west (Dongan-gyeonggul and Seobin-baeksa). The movie "In October" and "The mermaid" were shot at Cow Island, capitalizing on its picturesque scene of a fishing village and a lush, peaceful grassy field. The white sand beach facing the indigo and turquoise sea of Jeju is very impressive.

Seongsan Ilchulbong (Sunrise Peak)

99 rocky peaks surround the crater like a fortress and the gentle southern slope connected to water is a lush grassland. On the grassland at the entrance of Sunrise Peak, you can enjoy horseback riding. Breathtaking scenic views while taking a rest in the middle of climbing up the peak such as Mount Halla, the deep blues of the ocean, the multi-colored coast line, and the picturesque neighboring villages will become unforgettable memories.

Seopjikoji

Jutting out at the eastern seashore of Jeju Island, Seopji-Koji is one of the most scenic views with the bright yellow canola and Seongsan Sunrise Peak as a backdrop. The pristine beauty of Jeju can be seen in Seopji-koji. Sinyang Beach, a meadow filled with canola flowers, peacefully grazing Jeju ponies, a rocky sea cliff, and a towering legendary large rock (Sunbawe) all combine to make nature s masterpiece. Unlike the other coastal areas of Jeju, it has red volcanic rock (songi) and strangely-shaped rocks that at low tide transform this area into a breath-taking stone exhibition gallery.

Travel Information

Manjang Cave

Manjang Cave, situated at Donggimnyeong-ri, Gujwa-eup, North Jeju, 30 kilometers east of Jeju City, was designated as Natural Monument No. 98 on March 28, 1970. The 7,416-meter long cave has been officially recognized as the longest lava tube in the world. The annual temperature inside the cave ranges from 11℃ to 21℃, thus facilitating a favorable environment throughout the year. The cave is also academically significant as rare species live in the cave. Created by spewing lava, "the lava turtle", "lava pillar", and "Wing-shaped Wall" look like the work of the gods. It is considered to be a world class tourist attraction.

Gimnyeong Maze Park

This park was opened to the public in 1997 after its development was begun in 1987. In the area of about 3300 square meters, there are 1232 Leylandii trees and two Gold Leylandii trees from England. The overall extended length of labyrinth is 932 m and the shortest course between entrance and exit is 190 m long. Manjang Cave Culture Center, located between Manjang Cave and Gimnyeoungsa Cave, is a part of Manjang Cave tourist complex which is currently being expanded. Three bridges totaling 46 m and an observatory give visitors ample opportunities for picture taking.

Mysterious Road (Dokkaebi Road)

On Mysterious Road (or Bugaboo Road), a parked car on a slight hill road rolls uphill instead of going downhill. This is a result of an optical illusion in which the lower part looks higher because of its surrounding environment.

Cheonjiyeon Waterfall

The waterfall falls from a precipice with thundering sounds, creating white water pillars. It has the name Cheonjiyon, meaning 'the heaven and the earth meet and create a pond'. At 22 m in height and 12 min width, the waterfall tumbles down to the pond to produce awe-inspiring scenery. The valley near the waterfall is home to Elaeocarpus sylvestrisvar, ellipticus, which is Natural Monument No. 163, Psilotum nudum, Castanopsis cuspidatavar.sieboldii, Xylosma congestum, Camellia and other subtropical trees. This place is also famous as home to the eel of Anguilla mauritiana, which is Natural Monument No. 27 and is active primarily at night.

Jeju International Convention Center (ICC)

The International Conventional Center Jeju serves as a world class venue for hosting a variety of different large-scale international events. With the vast Pacific Ocean at its front and majestic Mt. Halla towering behind it as a backdrop, ICC Jeju, standing 5 stories above ground and two levels underground, sprawls over 54,700 square meters of land. As ICC Jeju is nestled right in the middle of the Jungmun Tourism Resort Complex, major tourist sites such as Yeomiji Botanical Garden, Teddy Bear Museum, Jungmun Beach, Fishing Village Museum, Cheonjeyeon Waterfall, Jusangseolli, Gangjeong Resort, Yakcheonsa Temple and Beophwasa Temple are located conveniently nearby.

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