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ICUFN 2018

July 3(Tue.) ~ July 6(Fri.), 2018 | Prague, Czech Republic

The Tenth International Conference on Ubiquitous and Future Networks

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Final Program

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Message from Organizing Chairs

On behalf of the Organizing Committee, we would like to take this opportunity to express our excitement at hosting ICUFN 2018 in Prague, Czech Republic on July 2018. ICUFN 2018 is organized by the Korean Institute of Communications and Information Sciences (KICS) and technically co-sponsored by IEEE Communications Society (ComSoC) and IEICE Communications Society. With 10 years of history, the ICUFN conference has served as a premier international forum to provide a great opportunity for exchanging the state-of-the-art research advances in ubiquitous and future technologies and expanding the research community.

We would like to welcome you to Prague which is the capital and largest city in the Czech Republic, the 14th largest city in the European Union and also the historical capital of Bohemia. The city has been a political, cultural and economic center of central Europe complete with a rich history. Founded during the Romanesque and flourishing by the Gothic, Renaissance and Baroque eras, Prague was the capital of the kingdom of Bohemia and the main residence of several Holy Roman Emperors. It was an important city to the Habsburg Monarchy and its Austro-Hungarian Empire. Prague is home to a number of famous cultural attractions, many of which survived the violence and destruction of 20th-century Europe. Main attractions include the Prague Castle, the Charles Bridge, Old Town Square with the Prague astronomical clock, the Jewish Quarter, Petřín hill and Vyšehrad. Since 1992, the extensive historic center of Prague has been included in the UNESCO list of World Heritage Sites. An extensive modern public transportation system connects the city. The city has more than ten major museums, along with numerous theatres, galleries, cinemas and other historical exhibits. An extensive modern public transportation system connects the city. Also, it is home to a wide range of public and private schools, including Charles University in Prague, the oldest university in Central Europe.

We have prepared an exciting program for you in ICUFN 2018. We would like to express our sincere gratitude to all committee members and referees who made tremendous contributions to this event. In particular, our special thanks go to Technical Program Committee Chairs, Professors Sanghwan Lee, Xin WANG, Howon Kim, Suguru Kameda, Kun Yang, and all TPC members for their great efforts in preparing the technical program. Special thanks are extended to all workshop organizers for preparing excellent workshops. We do hope that you will take this unique opportunity to attend the technical and workshop sessions, meet the authors, and foster greater collaboration with other researchers. The Organizing Committee put a lot of effort to make this conference greatly successful and enjoyable. In addition, if you have extra time, please do not miss the chance to take a look around Prague.

We look forward to seeing you in Prague! We also wish your active participation and support in the future event.

Seong-Ho Jeong	Takeo Fujii	Jun Heo	Zary Segall	Zdenek Becvar
HUFS, Korea	Univ. of Electro-Comms, Japan	Korea Univ., Korea	KTH, Sweden	Czech Technical Univ. in Prague, Czech

Message from TPC Chairs

It is our great pleasure to welcome all of you to Prague, Czech Republic, from July 3 to 6, 2018, at the 10th International Conference on Ubiquitous and Future Networks (ICUFN). ICUFN has addressed all aspects of computing, networking, communications, and their convergence since 2009. This ICUFN 2018 will be also a successful conference covering a wide range of topics on ubiquitous and future network technologies.

This year we have received 447 paper submissions electronically from 31 countries in the world. Many of the papers were submitted from the Asia/Pacific region, and also the increasing number of submissions was made from Europe, USA, and Russia. A rigorous review process has followed in which all papers received three or more independent reviews. After the reviews and discussions, we have selected 213 technical papers for presentation at the conference. The accepted technical papers were organized into 27 technical sessions. The program is designed to provide a broad range of wireless and wired communications network technologies, including cognitive radios, wireless sensor networks, Internet of Things (IoT), broadband wireless communications, future network issues, mobile multimedia networking, and other important technologies.

Along with the contributions of prominent authors from around the world, we believe that this year's valuable and exciting program were made possible by the dedication of the technical program members. We are indebted to all of the TPC members for their active participation and precious time. We would also like to thank our sponsors, KICS, IEEE Communications Society, and IEICE Communications Society for their kind support of this successful event. We extend our sincere thanks to the Organizing Committee Chairs, Prof. Seong-Ho Jeong, Prof. Takeo Fujii, Prof. Jun Heo, Prof. Zary Segall, and Prof. Zdenek Becvar, for their continued support and guidance. We hope that all of you will enjoy the splendid program of ICUFN 2018 as well as the beautiful scenery and charm of Prague.

Sincerely,

Sanghwan Lee
Kookmin Univ., Korea

Xin WANG
Fudan Univ., China

Howon Kim
Pusan National Univ., Korea

Suguru Kameda
Tohoku Univ., Japan

Kun Yang
Univ. of Essex, UK

ICUFN 2018 Program at a Glance

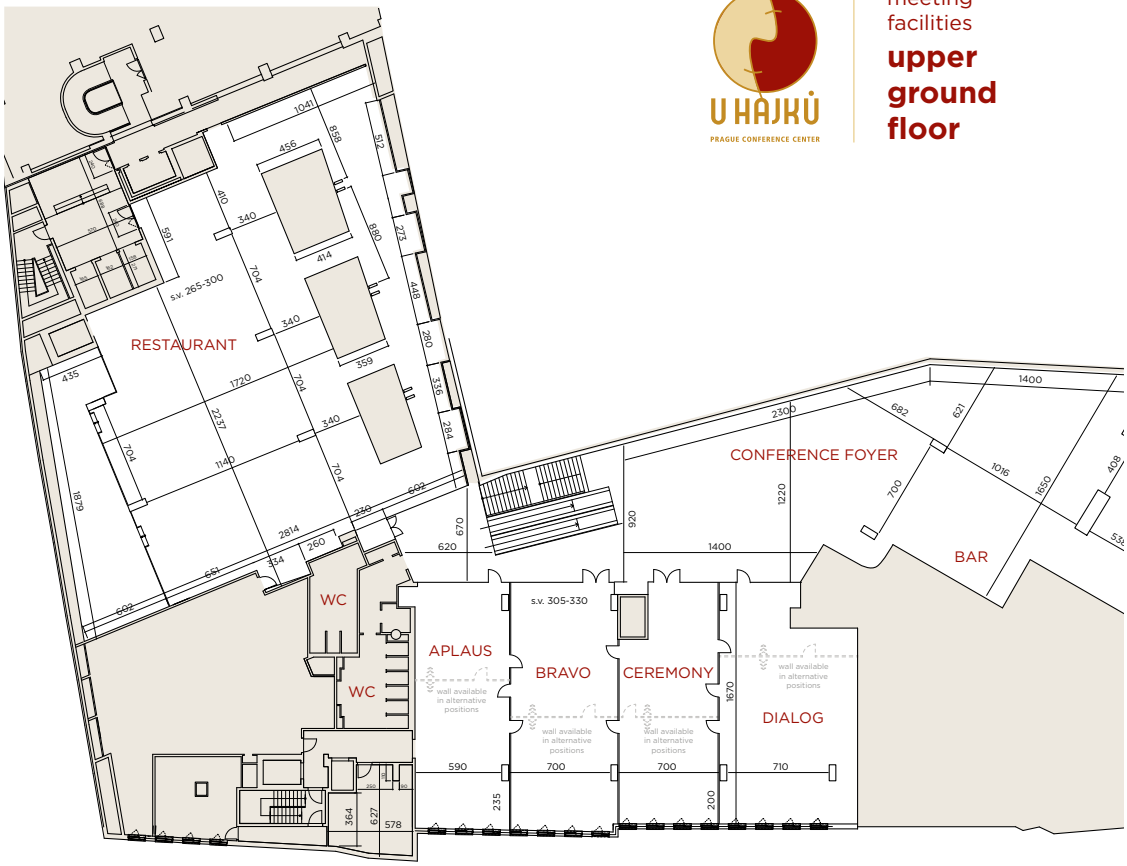
Room	Aplaus	Bravo	Ceremonie
July 3, 2018 (Tuesday)			
09:40 ~ 18:00	Registration		
13:00 ~ 14:30	**Oral 1A** DroneCAN 2018-I	**Oral 1B** IWMIL2018	**Oral 1C** IWFSO & IQI
14:30 ~ 14:40	Session Break		
14:40 ~ 16:10	**Oral 2A** DroneCAN 2018-II	**Oral 2B** IV2018	
16:10 ~ 16:30	Coffee Break		
16:30 ~ 18:00	**Oral 3A** Network Systems	**Oral 3B** Quality of Service	
July 4, 2018 (Wednesday)			
09:20 ~ 10:50	**Oral 4A** Future Internet and Network	**Oral 4B** SDN and Network Virtualization	**Oral 4C** Machine Learning and Computational Intelligence
10:50 ~ 11:00	Session Break		
11:00 ~ 11:20	**Opening Address:**	Prof. Seong-Ho Jeong (OC Co-Chair)	
	Welcome address:	Prof. Chung G. Kang (President of KICS) Prof. Zdenek Becvar (Czech Technical Univ. in Prague, Czech)	
11:20 ~ 12:20	**Keynote Speech 1:** **Collimated Light Propagation: The Next Frontier in Underwater Wireless Communications** Prof. Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST)) **Keynote Speech 2:** **Intelligent Edge Computing for 5G Networks** Prof. Choong Seon Hong (Kyung Hee University)		
12:20 ~ 13:50	Lunch Break		
13:50 ~ 15:20	**Oral 5A** Smart Grid and Green Internets	**Oral 5B** Internet of Things (IoT) - I	**Oral 5C** Wireless and Communication Network-I
15:20 ~ 15:50	Coffee Break		
15:50 ~ 17:20	**Oral 6A** Network Security and Management-I	**Oral 6B** Internet of Things (IoT) - II	**Oral 6C** Wireless and Communication Network-II
18:00 ~ 20:00	**Welcome Reception** Prof. Pascal LORENZ (University of Haute Alsace, France) Prof. Sungchang Lee (Korea Aerospace Univ., Korea)		

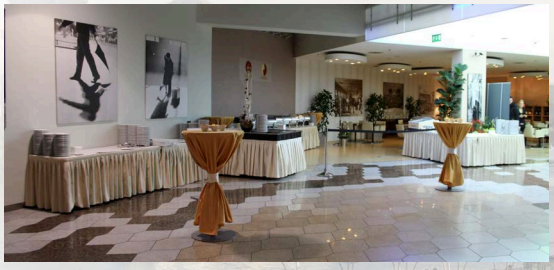
Room	Aplaus	Bravo	Ceremonie
July 5, 2018 (Thursday)			
09:20 ~ 10:50	Oral 7 Wireless and Communication Network-III	Poster Session 1 (Conference Foyer)	
10:50 ~ 11:10	Session Break		
11:10 ~ 12:40	Oral 8 Cloud Computing and Networks	Poster Session 2 (Conference Foyer)	
12:40 ~ 14:00	Lunch Break		
14:00 ~ 15:30	Oral 9 Wireless Sensor Networks-I	Poster Session 3 (Conference Foyer)	
15:30 ~ 16:00	Coffee Break		
16:00 ~ 17:30	Oral 10 Network Applications	Poster Session 4 (Conference Foyer)	
18:30 ~ 20:30	Banquet : Banquet Speech: Prof. Sang Hong Lee (Dankook University, Former President of IITP)		
July 6, 2018 (Friday)			
09:20 ~ 10:50	Oral 11A Network Security and Management-II	Oral 11B Wireless and Communication Network-IV	Oral 11C Wireless Sensor Networks-II

Conference Room Map

U HAJKŮ
PRAGUE CONFERENCE CENTER

meeting facilities
upper ground floor





11:20-12:20, July 4, 2018 (Wednesday)

Keynote Speech 1:
Collimated Light Propagation: The Next Frontier in Underwater Wireless Communications

Speaker: Prof. Mohamed-Slim Alouini, IEEE Fellow, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

Abstract:
Traditional underwater communication systems rely on acoustic modems due to their reliability and long range. However, their limited data rates lead to the exploration of alternative techniques. This talk briefly goes over the potential offered by underwater wireless optical communication systems and then summarizes some of the underwater channel challenges going from severe absorption and scattering that need to be surpassed before such kind of systems can be deployed in practice. We finally present some of the on-going research directions in the area of underwater wireless optical communication systems in order to better characterize and model the underwater optical channel and design, develop, and test experimentally new suitable modulation and coding techniques appropriate for this environment.

Biography

Prof. Mohamed-Slim Alouini received the Ph.D. degree in Electrical Engineering from the California Institute of Technology (Caltech), Pasadena, CA, USA, in 1998. He served as a faculty member in the University of Minnesota, Minneapolis, MN, USA, then in the Texas A&M University at Qatar, Education City, Doha, Qatar before joining King Abdullah University of Science and Technology (KAUST), Thuwal, Makkah Province, Saudi Arabia as a Professor of Electrical Engineering in 2009.

Prof. Alouini's current research interests include design and performance analysis of diversity combining techniques, MIMO techniques, multi-hop/cooperative communications systems, optical wireless communication systems, cognitive radio systems, and multi-resolution, hierarchical and adaptive modulation schemes. He has published several papers on the above subjects and he is co-author of the textbook Digital Communication over Fading Channels published by Wiley Interscience. He has also won several awards in his career. For instance, he received the 2016 Recognition Award of the IEEE Communication Society Wireless Technical Committee, the 2016 Abdul Hameed Shoman Award for Arab Researchers in Engineering Sciences, and the Inaugural Organization of Islamic Cooperation (OIC) Science & Technology Achievement Award in Engineering Sciences in 2017.

Other recognitions include his selection as Fellow of the Institute of Electrical and Electronics Engineers (IEEE), IEEE Distinguished Lecturer for the IEEE Communication Society, member for several times in the annual Thomson ISI Web of Knowledge list of Highly Cited Researchers as well as the Shanghai Ranking/Elsevier list of Most Cited Researchers, and a co-recipient of best paper awards in eleven IEEE conferences (including ICC, GLOBECOM, VTC, PIMRC, ISWCS, and DySPAN).

Keynote Speech 2:
Intelligent Edge Computing for 5G Networks

Speaker: Prof. Choong Seon Hong, Dept. of Computer Science and Engineering, Kyung Hee University, Korea

Abstract:
In recent years, wireless users have become producers and consumers of contents as their devices are now embedded with various sensors, which help in creating and collecting various types of data from different domains such as energy, agriculture, healthcare, transport, security, and smart homes, among others. Indeed, by the year 2020, it is anticipated that 50 billion things will be connected to the Internet, which is equivalent to 6 devices per person on the planet. Therefore, the devices of wireless users will be anywhere, anytime, and connected to anything. This large-scale interconnection of people and things, there will be a tremendous growth of data traffic (from user devices) with different characteristics (unstructured, quasi-structured, and semi-structured) whose scale, distribution, diversity, and velocity fall into a big data framework that requires big data infrastructure and analytics. Since the resources (e.g., battery power, CPU cycles, memory, and I/O data rate) of edge user devices are limited, edge user devices must offload computational tasks and big data to the cloud. However, for effective big data analytics of delay sensitive and context-

aware applications, there is a strong need for low-latency and reliable computation. As such, reliance on a cloud can hinder the performance of big data analytics, due to the associated overhead and end-to-end delays. This motivates to find novel techniques and cutting edge technologies for the 5G cellular networks to meet and enhance the diverse service requirements.
To reduce end-to-end delay and the need for extensive user-cloud communication, multi-access edge computing (MEC) has been introduced by the European Telecommunications Standards Institute (ETSI) as a supplement to cloud computing and mobile edge computing. MEC extends cloud computing capabilities by providing IT-based services and cloud computing capabilities at the edges of the networks. In other words, MEC pushes computation, caching, communication, and control (4C) to the edge of the network. Typically, MEC servers are deployed at the base stations (BSs) of a wireless network (e.g., a cellular network) for executing delay sensitive and context-aware applications in close proximity to the users. Therefore, data and computational task offloading to a nearby MEC server can significantly reduce the end-to-end delay, data exchange between users and the remote cloud, and solve the problem of moving data to the remote cloud and returning computation outputs to the users. In other words, data will be offloaded, processed, analyzed, and cached at the edge of the network, e.g., MEC servers, near where data is created.
To unleash the true potential of edge computing in 5G networks, artificial intelligence techniques (such as Deep Recurrent Neural Networks, Deep Q-Network, etc...) are required to seamlessly operate and fulfill the service requirements for the 5G networks. In this keynote we present the potential benefits for edge computing and artificial intelligence for 5G networks. We also discuss the current trends for the artificial intelligence techniques and edge computing from the industrial point of view. Moreover, we also provide an architectural vision for artificial intelligence based edge computing. Specifically, we aim to highlight the opportunities and challenges brought by different artificial intelligence techniques and how can they be incorporated in the 5G networks. Finally, we present a use case scenario for content's popularity prediction and cache decision in which we utilize the Recurrent Neural Network specifically Long Short-Term Memory (LSTM). Through this, we can maximize the cache hit, in order to reduce access latency for novel 5G services such as ultra-reliable low latency communication (URLLC) and enhanced mobile broadband (eMBB) service.

Biography

Prof. Choong Seon Hong (hereafter CS) received his B.S. and M.S. degrees in electronic engineering from Kyung Hee University, Seoul, Korea, in 1983, 1985, respectively. In 1988, he joined KT, where he worked on Broadband Networks as a member of the technical staff. From September 1993, he joined Keio University, Japan. CS received the Ph.D. degree at Keio University in March 1997. CS had worked for the Telecommunications Network Lab., Korea Telecom (KT) as a senior member of technical staff and as a director of the networking research team for research and development of the next generation operation support system until August 1999. Since September 1999, CS has worked as a professor of the department of computer science and engineering, Kyung Hee University. And CS is now serving as the Dean for Office of Information Services, Kyung Hee University.
CS has served as a General Chair, TPC Chair/Member, or an Organizing Committee Member for International conferences such as NOMS, IM, APNOMS, E2EMON, CCNC, ADSN, ICPP, DIM, WISA, BcN, TINA, SAINT, ICOIN, ICCE, ICUMU, ICUIMC, ICDC, ISPLC, ICC, Globecom and many other international conferences. Especially, CS was the General Chairs in IEEE/IPSJ SAINT 2010, APNOMS 2012, BigComp 2017 and the Organizing Committee Chair of International conference on Information Networking (ICOIN) 2009. And CS was TPC Co-chairs of IEEE/IFIP International Symposium on Integrated Network Management (IM) 2013, APNOMS 2002, APNOMS 2007, APNOMS 2009 and IEEE/IFIP Broadband Convergence Networks Workshop 2009. As for Awards, CS received Best Paper Award from IEEE ICC 2016, ICOIN 2012, APNOMS 2008, and APNOMS 2007. And CS received Gaheon Scientific Research Award (which is the most honorable academic award in Korean information and computer science society) from Korean Institute of Information Scientist and Engineers (KIISE) in 2010, and The Year 2006 Scientific Research Award from Korea Information Processing Society (KIPS).
CS had also served as an associate editor of IEEE Transactions on Network and Service Management, International Journal of Network Management, Journal of Communications and Networks, and is serving an Associate Technical Editor of IEEE Communications Magazine and International Journal of Network Management. And CS is a Senior Member of IEEE, and a Member of ACM, IEICE, IPSJ, KIISE, KICS, KIPS and OSIA. CS was the president of Open Standard and Internet Association (OSIA) in 2013. And CS was President of the Korean Institute of Information Scientists and Engineers in 2016. CS's research interests include Future Internet, Heterogeneous network, Network Management, Service Management, Network Security, Internet Services and Edge Computing. CS published 170 international journal papers and 260 international conference papers.

July 3, 2018 (Tuesday)

[13:00-14:30, Aplaus]

ORAL SESSION 1A
DroneCAN 2018-I

Chair: Hwangnam Kim (Korea University)

[01A-1] devKopter, Multicopter Development Platform for Engineers
Minwoo Kim and Bosung Lee (Korea Aerospace Research Institute, Korea)

[01A-2] Simultaneous Attack on Drone and GCS in UAV Systems
Jaemin Yu, Byeong-Moon Cho, and Kyung-Joon Park (DGIST, Korea); Hwangnam Kim (Korea University, Korea)

[01A-3] Unmanned Aerial System Traffic Management with WAVE Protocol for Collision Avoidance
Jong-Hong Park, Sung-Chan Choi, Jaeho Kim, and Kwang-Ho Won (Korea Electronics Technology Institute, Korea)

[01A-4] Small Drone Development for Public Service Relating to Korean PPI
Yong Wun Jung, Wanggu Kang, and In Seong Hwang (KARI, Korea)

[13:00-14:30, Bravo]

ORAL SESSION 1B
IWMIL2018

Chair: Junhee Seok (Korea University)

[01B-1] Rank Prediction for Portfolio Management Using Artificial Neural Networks
Jiyoon Bae, Hyungbin Yun, Ghudae Sim, and Junhee Seok (Korea University, Korea)

[01B-2] A Comparison of Penalized Regressions for Estimating Directed Acyclic Networks
Kyu Min Lee, Sung Won Han, and Hyungbin Yun (University of Korea, Korea)

[01B-3] Indoor Semantic Segmentation for Robot Navigating on Mobile
Wonsuk Kim and Junhee Seok (Korea University, Korea)

[01B-4] Detecting Selfish Backoff Attack in IEEE 802.15.4 CSMA/CA Using Logistic Classification
Joongheon Kim and Kyeong Seon Kim (Chung-Ang University, Korea)

[01B-5] Classifier Comparison for Failure Detection of Induction Motors Using Current Signal
GyuBeom Han and Jong-Kook Kim (Korea University, Korea)

[13:00-14:30, Ceremonie]

ORAL SESSION 1C
IWFSO & IQI

Chair: Jun Heo (Korea University)

[01C-1] BER Analysis of Wavelength Division Multiplexing-Based Multiple Beam Scheduling Scheme Based on Gamma Approximation Channel
Sung Sik Nam and Ju-Hyung Lee (Korea University, Korea); Chang Seok Yoon (Korea Electronics Technology Institute, Korea); Young-Chai Ko (Korea University, Korea)

[01C-2] Trajectory Optimization of Energy Efficient FSOC-UAV with Atmospheric and Geometric Loss
Ju-Hyung Lee (Korea University, Korea); Ki-Hong Park and Mohamed-Slim Alouini (King Abdullah University of Science and Technology (KAUST), Saudi Arabia); Young-Chai Ko (Korea University, Korea)

[01C-3] Impact of Both Nonzero Boresight and Jitter Pointing Error on Outage Capacity of FSO Communication Systems over Strong Turbulence
Kug-Jin Jung, Sung Sik Nam, and Young-Chai Ko (Korea University, Korea)

[01C-4] Efficient Reconciliation Protocol with Polar Codes for Quantum Key Distribution
Sunghoon Lee and Jun Heo (Korea University, Korea)

[01C-5] An Introduction to Fault-Tolerant Quantum Computation and Its Overhead Reduction Schemes
Il Kwon Sohn and Jun Heo (Korea University, Korea)

[01C-6] Implementation of Plug & Play Quantum Key Distribution Protocol
Byungkyu Ahn, Jinyoung Ha, and Youngjin Seo (Korea University, Korea); Jeonghwan Shin and Kyungwoon Lee (KT, Institution of Convergence Technology, Korea); Jun Heo (Korea University, Korea)

[14:40-16:10, Aplaus]

ORAL SESSION 2A
DroneCAN 2018-II

Chair: Kyung-Joon Park (DGIST)

[02A-1] Geolocation-based Routing Protocol for Flying Adhoc Networks (FANETs)
Sung-Chan Choi, Hassen Redwan Hussen, Jong-Hong Park, and Jaeho Kim (Korea Electronics Technology Institute, Korea)

[02A-2] Active Decoupling Control for a Planetary Coaxial Helicopter Using Force Feedback
Brijith Balakrishnan (National Institute of Technology Karnataka, India); G Shamrao and Aditya R (ISRO SATELLITE CENTRE, India); Narendranath S (National Institute of Technology Karnataka, India); Venkatesha Prasad (Delft University of Technology, The Netherlands); Sujay Narayana (TU Delft, The Netherlands)

[O2A-3] Study on the Network Architectures for Message Ferry Networks with Multiple UAVs
Mehdi Harounabadi (Ilmenau University of Technology, Germany); Martin Bocksberger (TU Ilmenau, Germany); Andreas Mitschele-Thiel (Ilmenau University of Technology, Germany)

[O2A-4] Dynamic Detection-Tracking Switching
Bruno Andries and Junhyeon Park (Korea Advanced Institute of Science and Technology, Korea); Sung Ju Hwang (KAIST, Korea); Minwoo Kim (Korea Aerospace Research Institute, Korea)

[O2A-5] Performance Analysis of MANET Routing Protocols for UAV Communications
Hassen Redwan Hussen, Sung-Chan Choi, Jong-Hong Park, and Jaeho Kim (Korea Electronics Technology Institute, Korea)

[14:40-16:10, Bravo]

ORAL SESSION 2B
IV2018

Chair: Dong Seog Han (Kyungpook National University)

[O2B-1] Real-time Drowsiness Detection Algorithm for Driver State Monitoring Systems
Jang Woon Baek (ETRI, Korea)

[O2B-2] Radar and Vision Sensor Fusion for Object Detection in Autonomous Vehicle Surroundings
Kim Jihun (Kyungpook National University, Korea); Benaoumeur Senouci (ECE Paris, France); Dong Seog Han (Kyungpook National University, Korea)

[O2B-3] Performances Evaluation study of VANET Communication Technologies for Smart and Autonomous Vehicles
Ben Senouci (ECE Paris, France); Yasser Abdelaziz Dahou Djilali and Yassine Bakhti (Telecommunication and Information Technology Institute, Algeria); Belkacem Kouninef (Laboratoire LaRATIC, INTTIC of Oran Algeria, Algeria)

[O2B-4] Vehicular Acceleration Advisory Algorithm Using V2V Communication in Highway Junction Point
Kwang-Wook Yun, Hyeong-Geon Kim, Joonho Kwon, Han-You Jeong, and Yoon-Ho Choi (Pusan National University, Korea)

[O2B-5] Vehicle Color Recognition via Representative Color Region Extraction and Convolutional Neural Network
Kwang-Ju Kim and Pyong-Kun Kim (ETRI, Korea); Kil-Taek Lim (Electronics and Telecommunications Research Institute, Korea); Yun-Su Chung (Electronics and Telecommunication Research Institute, Korea); Yun-Jeong Song and Soo In Lee (Electronics and Telecommunications Research Institute, Korea); Doo-Hyun Choi (Kyungpook national university, Korea)

[16:30-18:00, Aplaus]

ORAL SESSION 3A
Network Systems

Chair: Hyunggon Park (Ewha Womans University)

[O3A-1] Fuzzy Logic Based Network Selection in Hybrid OCC/Li-Fi Communication System
Moh Khalid Hasan, MD Shahjalal, Mostafa Zaman Chowdhury, Md. Tanvir Hossan, and Yeong Min Jang (Kookmin University, Korea)

[O3A-2] Error Mitigation in Optical Camera Communication Based Indoor Positioning System
MD Shahjalal, Moh Khalid Hasan, Md. Tanvir Hossan, Mostafa Zaman Chowdhury, and Yeong Min Jang (Kookmin University, Korea)

[O3A-3] Enhanced Failure Recovery Mechanism Using OpenState Pipeline in SDN
Abdullah Soliman Alshra'a (Technische Universität Ilmenau, Germany); Parag Sewalkar and Jochen Seitz (Technische Universitaet Ilmenau, Germany)

[O3A-4] Integration of Multiple IP Domains in Low-cost and Security-oriented Small Networks
Satoshi Kodama and Rei Nakagawa (Tokyo University of Science, Japan)

[O3A-5] OCC Protocol for Connected LEDs in Optical Camera Communication Networks
Thanh Luan Vu, Minh Duc Thieu, Van Thang Nguyen, and Yeong Min Jang (Kookmin University, Korea)

[16:30-18:00, Bravo]

ORAL SESSION 3B
Quality of Service

Chair: Seokjoo Shin (Chosun University)

[O3B-1] Leveraging OTT and ISP Cooperation to Enhance End to End QoS by Exchanging Valuable Resources
Michele Scarlato (University of Cagliari, Italy); Jordi Ortiz (University of Murcia, Spain); Cristian Perra (University of Cagliari, Italy); Antonio Fernando Skarmeta Gomez (University of Murcia, Spain)

[O3B-2] An Implementation of Binary Frequency Shift On-Off Keying Modulation for Optical Camera Communication
Van Thang Nguyen, Nam Tuan Le, Thanh Luan Vu, Minh Duc Thieu, and Yeong Min Jang (Kookmin University, Korea)

[O3B-3] Towards Application-Aware Networking: ML-based End-to-End Application KPI/QoE Metrics Characterization in SDN
Hamed Z Jahromi, Andrew Hines, and Declan T. Delaney (University College Dublin, Ireland)

[03B-4] New Waveforms for Selective-RoI-Signaling High-rate Optical Camera Communication System
Minh Duc Thieu (Kookmin University, Korea); Trang Nguyen (Kookmin University, Korea); Thanh Luan Vu, Van Thang Nguyen, and Yeong Min Jang (Kookmin University, Korea)

[03B-5] Adaptive ONU Energy-Saving via Software-Defined Mechanisms in TDMA-PON
Andrew Fernando Pakpahan (Yuan Ze University, Taiwan); I-Shyan Hwang (Yuan-Ze University, Taiwan)

July 4, 2018 (Wednesday)

[09:20-10:50, Aplaus]

ORAL SESSION 4A
Future Internet and Network

Chair: Kaewon Choi (SKKU)

[04A-1] Cooperative Spectrum Sensing Algorithm Based on Phase Compensation in Cognitive Cloud Networks
Li Wang, Xiaoxiao Wu, Shibing Zhang, Guodong Zhang, and Zhihua Bao (Nantong University, P.R. China)

[04A-2] User-Driven Smart Home Control System Based on Named Data Networking
Manxin Huang, Ru Li, Jun Fan, and Xin Zhang (Inner Mongolia University, P.R. China)

[04A-3] Path Provisioning for Fibbing Controlled Load Balanced IP Networks
Saeed Barkabi Zanjani, Kuang-Yi Li, Steven S. W. Lee, and Yuan-Sun Chu (National Chung Cheng University, Taiwan)

[04A-4] A Cache Replacement Strategy Based on Hierarchical Popularity in NDN
YingQi Li, Meiju Yu, and Ru Li (Inner Mongolia University, P.R. China)

[04A-5] Fair and Efficient Channel Observation-Based Listen-Before Talk (CoLBT) for LAA-WiFi Coexistence in Unlicensed LTE
Rashid Ali (WIN LAB., Yeungnam University & WINLab, Korea); Nurullah Shahin and Arslan Musaddiq (Yeungnam University, Korea); Byung-Seo Kim (Hongik University, Korea); Sung Won Kim (Yeungnam University, Korea)

[09:20-10:50, Bravo]

ORAL SESSION 4B
SDN and Network Virtualization

Chair: Takeo Fujii (The University of Electro-Communications)

[04B-1] Distributed NFV Orchestration in a WMN-based Disaster Network
Gregor Frick, Auberlin Paguem Tchinda, Ulrich Trick, and Armin Lehmann (Frankfurt University of Applied Sciences, Germany); Bogdan Ghita (Plymouth University, United Kingdom (Great Britain))

[04B-2] Relay-Based iBGP Multicasting in Software Defined Networks
Ukemeobong Bassey (University of Ottawa, Canada); Amiya Nayak (SITE, University of Ottawa, Canada)

[04B-3] MACsec Extension over Software-Defined Networks for In-Vehicle Secure Communication
Ju-Ho Choi and Sung-Gi Min (Korea University, Korea); Youn-Hee Han (Korea University of Technology and Education, Korea)

[04B-4] Design of an SDN Security Mechanism to Detect Malicious Activities
Christopher Mansour and Danai Chasaki (Villanova University, USA)

[04B-5] An Efficient Label-Based Packet Forwarding Scheme in Software Defined Networks
Yeim-Kuan Chang, Yi-Tsung Huang, and Yu-To Chen (National Cheng Kung University, Taiwan)

[09:20-10:50, Ceremonie]

ORAL SESSION 4C
Machine Learning and Computational Intelligence

Chair: Benaoumeur Senouci (ECE Paris)

[04C-1] Development of a Hybrid Decision-Making Method Based on a Simulation-Genetic Algorithm in a Web-Oriented Metallurgical Enterprise Information System
Konstantin Aksyonov and Anna Antonova (Ural Federal University, Russia)

[04C-2] Non Keyword-Based Music Retrieval Using Social Tags
Chang Bae Moon, Jong Yeol Lee, Dong-Seong Kim, and Byeong Man Kim (Kumoh National Institute of Technology, Korea)

[04C-3] Automatic Sleep Stage Classification Using EEG and EMG Signal
Hyungjik Kim and Sunwoong Choi (Kookmin University, Korea)

[04C-4] C4.5 Decision Tree Machine Learning Algorithm Based GIS Route Identification
Anurag Yadav (CDOT, India); Pankaj Kumar Dalela, Prashant Bansal, Vipin Tyagi, and Arun Yadav (C-DOT, India); Sabyasachi Majumdar (Research Engineer, India)

[04C-5] UAV Detection Using the Cepstral Feature with Logistic Regression
Yoojeong Seo, Beomhui Jang, Jangwon Jung, and Sungbin Im (Soongsil University, Korea)

[13:50-15:20, Aplaus]

ORAL SESSION 5A
Smart Grid and Green Internets

Chair: Soo-Hyun Park (Kookmin University)

[05A-1] Routing Redundancy Reducing Method for U-Bus Air Using Cloud Cooperation
Hiroshi Sanada (The University of Electro-Communications, Japan); Takuya Kawata (Tokyo Gas, Japan); Reina Aizawa (Tokyo Gas Co., Ltd, Japan); Takeo Fujii (The University of Electro-Communications, Japan)

[05A-2] Modeling of Management System for Hydroelectric Power Generation from Water Flow
Kwang-Soon Choi and Ji-Woon Yeom (Korea Electronics Technology Institute, Korea)

[05A-3] Path Similarity Based Spurious Retransmission Minimization over Flooding Based Routing in UWSN
Yeongjoon Bae, Sungwon Lee, Yonghwan Jeong, and Dongkyun Kim (Kyungpook National University, Korea)

[05A-4] Design and Development of a WAVE Simulator Interoperable with Traffic Simulators
Won Hwa Lee, Tae Hoon Kwon, Minjin Baek, and Sang-Sun Lee (Hanyang University, Korea)

[13:50-15:20, Bravo]

ORAL SESSION 5B
Internet of Things (IoT) - I

Chair: Amiya Nayak (University of Ottawa)

[05B-1] Design and Evaluation of a Hybrid D2D Discovery Mechanism in 5G Cellular Networks
Mingfu Li and Hsin-Ling Tsai (Chang Gung University, Taiwan)

[05B-2] Reduction Scheme for Sensor-Data Transmission on a Big Data Streaming Platform
Sheng-Tzong Cheng and Yi-Wei Huang (National Cheng Kung University, Taiwan)

[05B-3] Trust-based Composition of M2M Application Services
Besfort Shala, Ulrich Trick and Armin Lehmann (Frankfurt University of Applied Sciences, Germany); Bogdan Ghita and Stavros Shiaeles (Plymouth University, United Kingdom (Great Britain))

[05B-4] Topic Based Clustering of Vehicles for Information Retrieval and Sharing
Lijun Dong (Huawei, USA); Richard Li (Huawei USA, USA)

[05B-5] Improving Physical Layer Security of NOMA Networks by Using Opportunistic Scheduling
Kyusung Shim (Hongik University, Korea); Tri Nhu Do (Hongik University, Sejong Campus, Korea); Beongku An (Hongik University, Korea)

[13:50-15:20, Ceremonie]

ORAL SESSION 5C
Wireless and Communication Network-I

Chair: Stefano Tomasin (University of Padova)

[05C-1] Tunnel-Based EAP Effective Security Attacks-WPA2 Enterprise Evaluation and Proposed Amendments
Mohamed A. Abo-Soliman (Nile University, Egypt); Marianne A. Azer (National Telecommunication Institute + Nile University, Egypt)

[05C-2] Information and Energy Cooperation in Overlay Hierarchical Cognitive Radio Networks
Kun-Yueh Hsieh and Fan-Shuo Tseng (National Sun Yat-sen University, Taiwan); Meng-Lin Ku (National Central University, Taiwan); Chao-Yuan Hsu (Chunghwa Telecom Co., Ltd)

[05C-3] Construction of Frequency-Hopping System Using RF Communications Trainer
Eisuke Kudoh, Hiroya Fujisawa, and Kohya Satoh (Tohoku Institute of Technology, Japan)

[05C-4] Robust Spectrum Sensing Based on Hyperbolic Tangent in Gaussian and Non-Gaussian Noise Environments
Hua Qu, Xiguang Xu, Jihong Zhao, Feiyu Yan, and Weihua Wang (Xi'an Jiaotong University, P.R. China)

[05C-5] Relay Position Considering Interference from Other Sub-Channels in D2D Group-casting Systems
Eulhyeon Go, Soyi Kim, Minjoong Rim, Junghwan Kim, and Yoonseok Song (Dongguk University, Korea)

[15:50-17:20, Aplaus]

ORAL SESSION 6A
Network Security and Management-I

Chair: Sunwoong Choi (Kookmin University)

[06A-1] An Ahead-of-Time Compiler System for the IoT-Cloud Virtual Machine
Junho Jeong (Electronic Commerce Institute, Dongguk University Gyeongju Campus, Korea); Yunsik Son (Dongguk University, Korea); YangSun Lee (Seokyeong University, Korea)

[06A-2] False Secret Keys to Disturb Power Analysis
Seungkwang Lee and Taesung Kim (ETRI, Korea)

[06A-3] A Comparative Study of Off-Line Deep Learning Based Network Intrusion Detection
Jiaqi Yan and Dong Jin (Illinois Institute of Technology, USA); Cheol Won Lee (National Security Research Institute, Korea); Ping Liu (Illinois Institute of Technology, USA)

[06A-4] Memory-Efficient Random Forest Generation Method for Network Intrusion Detection
Seok-Hwan Choi, DongHyun Ko, SeonJin Hwang, and Yoon-Ho Choi (Pusan National University, Korea)

[O6A-5] Blockchain Based Billing System for Electric Vehicle and Charging Station
Seohyeon Jeong, Nhu-Ngoc Dao, Yunseong Lee, Cheol Lee, and Sungrae Cho (Chung-Ang University, Korea)

[15:50-17:20, Bravo]

ORAL SESSION 6B
Internet of Things (IoT) - II

Chair: Gongchao Su (Shenzhen University)

[O6B-1] An Improved Mobility Support Mechanism for Downward Traffic in RPL
Soon-Woong Min, Sang-Hwa Chung, and Yu-Vin Ha (Pusan National University, Korea)

[O6B-2] Performance Evaluation of Centralized and Distributed Control Methods for Efficient Registration of Massive IoT Devices
Nurullah Shahin (Yeungnam University, Korea); Rashid Ali (WIN LAB., Yeungnam University & WINLab, Korea); Seung Yeob Nam and Young-Tak Kim (Yeungnam University, Korea)

[O6B-3] Fuzzy Energy Efficient Routing for Internet of Things (IoT)
Babar Shah (Zayed University, United Arab Emirates)

[O6B-4] High-level Architectural Design of Management System for the Internet of Underwater Things
Khamdamboy Urunov, Soo-Young Shin, Jung-Il Namgung, and Soo-Hyun Park (Kookmin University, Korea)

[15:50-17:20, Ceremonie]

ORAL SESSION 6C
Wireless and Communication Network-II

Chair: Eisuke Kudoh (Tohoku Institute of Technology)

[O6C-1] An Efficient Backoff Scheme in Wireless Sensor Networks
Batbayar Khandish and Eunsik Lee (Yonsei University, Wonju, Korea); Hyun Park (Yonsei University, Korea); Jung-Bong Suk (Yonsei University, Wonju, Korea)

[O6C-2] A Study on the Effect of Moving Small Cell in Heterogeneous Networks with Interference Cancellation
Inseok Kang, Sarang Han, and Cheolwoo You (MyongJi University, Korea)

[O6C-3] A Machine-Learning-Based Handover Prediction for Anticipatory Techniques in Wi-Fi Networks
Stefano Tomasin and Mauro Feltrin (University of Padova, Italy)

[O6C-4] Optimization-Based Resource Management Strategies for 5G C-RAN Slicing Capabilities
Frank Yeong-Sung Lin and Chiu-Han Hsiao (National Taiwan University, Taiwan); Yean-Fu Wen (National Taipei University, Taiwan); Ya-Syuan Wu (National Taiwan University, Taiwan)

[O6C-5] User Detection Performance Analysis for Grant-Free Uplink Transmission in Large-Scale Antenna Systems
Jonghyun Kim, Kyung Lin Ryu, and Kwang Soon Kim (Yonsei University, Korea)

[O6C-6] Detectors for Intent ICC Security Vulnerability with Android IDE
Xianyong Meng and Kai Qian (Kennesaw State University, USA); Prabir Bhattachrya (Morgan State University, USA); Dan Chia-Tien Lo (Kennesaw State University, USA)

July 5, 2018 (Thursday)

[09:20-10:50, Aplaus]

ORAL SESSION 7
Wireless and Communication Network-III

Chair: Hiroyuki Otsuka (Kogakuin University)

[O7-1] Multichannel-Sniffing-System for Real-World Analysing of Wi-Fi-Packets
Kristof Friess (Erfurt University of Applied Sciences, Germany)

[O7-2] AL-FEC Application on NGMN-Edge Computing Integrated Systems
Christos Bouras (University of Patras CTI&P-Diophantus & University of Patras, Greece); Nikolaos Kanakis (University of Patras, Greece)

[O7-3] Beamformer Design and Power Allocation for Two-Cluster Two-User NOMA System
Carlo Piccoli and Stefano Tomasin (University of Padova, Italy); Eduard Jorswieck (TU Dresden, Germany)

[O7-4] Joint User Association and RRH Clustering in Cloud Radio Access Networks
Hussein Taleb (ESIB, Saint-Joseph University, Lebanon); Melhem El Helou (Saint Joseph University of Beirut, Lebanon); Kinda Khawam (Université de Versailles, France); Samer Lahoud (ESIB, Saint-Joseph University of Beirut, Lebanon); Steven Martin (Paris-Sud University, France)

[O7-5] Pseudo-Random Beamforming with Beam Selection for Improving Physical-Layer Security
Woong Son, Bang Chul Jung, and Choul-Young Kim (Chungnam National University, Korea); Jongmin Kim (KAIST, Korea)

[O7-6] Downlink Multiuser Superposition Using QPSK and 256-QAM in Mobile Communication Systems
Koki Senda and Hiroyuki Otsuka (Kogakuin University, Japan)

[11:10-12:40, Aplaus]

ORAL SESSION 8
Cloud Computing and Networks

Chair: Sanghwan Lee (Kookmin University)

[O8-1] Cloud-based Microservices to Decision Support
Konstantin Aksyonov, Andrew Kondratyev, Natalia Buravova, and Olga Aksyonova (Ural Federal University, Russia)

[O8-2] Monitoring of IoT Data for Reducing Network Traffic
Jeongjin Lee, Gunjae Yoon, and Hoon Choi (Chungnam National University, Korea)

[O8-3] Selective Encryption for 3D Printing Model in DCT Domain
Giao Ngoc Pham, Jin-Hyeok Park, Oh-Heum Kwon, and Ha-Joo Song (Pukyong National University, Korea); Suk-Hwan Lee (TongMyong University, Korea); Kwang-Seok Moon (Pukyong National University, Korea); Yeong-Rak Choi (Social Network Communication, Korea); Seok Tae Kim and Ki-Ryong Kwon (Pukyong National University, Korea)

[O8-4] Multi-Objective Mixed Integer Linear Programming Model for VM Placement to Minimize Resource Wastage in a Heterogeneous Cloud Provider Data Center
Rym Regaieg, Mohamed Koubaa, Evans Osei-Opoku, and Taoufik Aguili (Université Tunis El Manar - Ecole Nationale d'Ingénieurs de Tunis - Laboratoire SYStèmes de COMmunications)

[O8-5] Appliance Type Constraint Design for Demand Response Smart Grid Systems
Yongwoon Jang, Laihyuk Park, Woongsoo Na, Chunghyun Lee, and Sungrae Cho (Chung-Ang University, Korea)

[O8-6] Cloud Assisted Overlay Routing
Suat Mercan (American University of the Middle East, Kuwait)

[14:00-15:30, Aplaus]

ORAL SESSION 9
Wireless Sensor Networks-I

Chair: Mohammad Al Mojamed (UMM AL-QURA University)

[O9-1] Joint Clustering and Routing Protocol for 3-D Underwater Acoustic Sensor Network
Sarang Dhongdi, Aashray Bhandari, Jayati Singh, Spandan Kachhadia, and Varad Joshi (BITS Pilani K K Birla Goa Campus, India)

[O9-2] Novel Query Tree Algorithm Based on Reservation and Time-Divided Responses to Support Efficient Anti-Collision Protocol
Ji-Hwan Choi (Samsung Electronics, Korea); Hyuckjae Lee (Information and Communications University, Korea)

[O9-3] Enhancements of IEEE802.15.4e DSME Model of Wireless Sensor Networks
Sameer K. Alsudany, Said Boussakta, and Martin Johnston (Newcastle University, United Kingdom (Great Britain))

[O9-4] Performance Analysis of Hybrid-based Packet Forwarding in Wireless Sensor Networks
Irvanda Kurniadi Virdaus, Moonsoo Kang, and Chung Ghiu Lee (Chosun University, Korea)

[O9-5] To Improve the Convergence and Parallelism of Gauss-Seidel Routing Algorithm with Finite Element Method for Wireless Sensor Networks
Ren-Song Ko (National Chung Cheng University, Taiwan)

[O9-6] Research of optimal structure for autonomous earth-moving and construction machines' communication system
Tatyana Golubeva, Bahodir Yakubov, and Sergey Konshin (Almaty University of Power Engineering and Telecommunications, Kazakhstan); Boris Tshukin, Sergey Leshchev, and Natalia Mironova (National Research Nuclear University MEPhI, Russia)

[16:00-17:30, Aplaus]

ORAL SESSION 10
Network Applications

Chair: Ren-Song Ko (National Chung Cheng University)

[O10-1] Performance Evaluation of Community Detection Algorithms Based on Relationship Strength Measurement
Soom Behera and Haoye Lu (University of Ottawa, Canada); Amiya Nayak (SITE, University of Ottawa, Canada)

[O10-2] Mobility Robustness Optimization Based on Radio Link Failure Prediction
Yi-Wei Ma (Shanghai Maritime University, P.R. China); Jiann-Liang Chen (National Taiwan University of Science and Technology, Taiwan); Hao-Kai Lin (National Taiwan University of Science & Technology, Taiwan)

[O10-3] Performance Evaluation of Kademlia in Mobile Ad Hoc Networks
Mohammad Al Mojamed (UMM AL-QURA University, Saudi Arabia); Awwadh Al-shehri (Technical and Vocational Training Corporation, Saudi Arabia)

[O10-4] A Sequential Auction Game for QoS-aware User Association in Heterogeneous Cellular Networks
Gongchao Su (Faculty of Information Engineering, Shenzhen University, P.R. China)

[O10-5] A Novel Approach to Make Presentation Using Powerpoint Without Projector in Local Area Network
Daniel Silli Bataona (State Polytechnic of Kupang, Indonesia); Rinaldi Munir (Bandung Institute of Technology, Indonesia); Tutun Juhana (Institut Teknologi Bandung, Indonesia); Gloria Christiana Manulangga and Jemsrado Sine (State Polytechnic of Kupang, Indonesia)

[O10-6] Analysis of Call Detail Records of International Voice Traffic in Mobile Networks
Zagroz Aziz (Czech Technical University, Czech Republic); Robert Bestak (Czech Technical University in Prague, Czech Republic)

July 6, 2018 (Friday)

[09:20-10:50, Aplaus]

ORAL SESSION 11A
Network Security and Management-II

Chair: Qinghua Wang (Kristianstad University)

[O11A-1] SigPloit: A New Signaling Exploitation Framework
Loay Abdelrazek (Nile University, Egypt); Marianne Azer (National Telecommunication Institute + Nile University, Egypt)

[O11A-2] Adaptive Broadcast Routing Assignment Algorithm for Blockchain Synchronization Services
Frank Yeong-Sung Lin and Chiu-Han Hsiao (National Taiwan University, Taiwan); Yean-Fu Wen (National Taipei University, Taiwan); Yang-Che Su (National Taiwan University, Taiwan)

[O11A-3] Session Key Agreement for End-to-End Security in Time-Synchronized Networks
Qinghua Wang (Kristianstad University SWEDEN, Sweden); Xin Huang (Xi'an Jiaotong-Liverpool University, P.R. China); Dawit Mengistu (Kristianstad University, Sweden)

[O11A-4] Synchronization of Complex Dynamical Networks with Randomly Coupling via Nonfragile Control
Fehrs Adu-Gyamfi (University of Electronic Science and Technology of China, P.R. China); Yuhua Cheng and Chun Yin (University of Electronic Science and Technology of China & School of Automation Engineering, P.R. China); Shouming Zhong (University of Electronic and Technology of China, P.R. China)

[09:20-10:50, Bravo]

ORAL SESSION 11B
Wireless and Communication Network-IV

Chair: Huang-Chang Lee (Chang Gung University)

[O11B-1] Machine Learning Based Link-to-System Mapping for System-Level Simulation of Cellular Networks
Eunmi Chu, Hyuk Ju Jang, and Bang Chul Jung (Chungnam National University, Korea)

[O11B-2] Impact of SC-FDMA and Pilots on PAPR and Performance of Power Domain NOMA-UFMC System
Ajit Singh (Defence Institute of Advanced Technology Pune, India); K. Krishna Naik (Defence Institute of Advanced Technology, India); C.R.Suthikshn Kumar (DIAT, India)

[O11B-3] Low Complexity Polar Code Decoder for HARQ Application
Huang-Chang Lee (Chang Gung University, Taiwan); Guan-Chun Liao (Chang Gung University, Taoyuan, Taiwan)

[O11B-4] Research on Polar Code Construction Algorithms Under Gaussian Channel
Jianping Li, Man Hu, and Zhiyuan Cheng (Communication University of China, P.R. China)

[O11B-5] Multipath Selection Method for Maximum Ratio Combining in Underwater Acoustic Channels
Hojun Lee (Inha University, Korea); Jongmin An (University of Inha, Korea); Jongpil Seo and Jeahak Chung (Inha University, Korea)

[09:20-10:50, Ceremonie]

ORAL SESSION 11C
Wireless Sensor Networks-II

Chair: Sarang Dhongdi (BITS Pilani K K Birla Goa Campus)

[O11C-1] A Magnetic Field Detection and Localization Scheme for Internet of Underwater Things
Kwang-Yul Kim and Yoan Shin (Soongsil University, Korea)

[O11C-2] Localization of Submerged Sensors with a Single Beacon for Non-Parallel Planes State
Anisur Rahman and Vallipuram Muthukkumarasamy (Griffith University, Australia)

[O11C-3] A Multi-node Rechargeable Algorithm via Wireless Charging Vehicle with Optimal Traveling Path in Wireless Rechargeable Sensor Networks
Fan Zhang (Hohai University, P.R. China); Jie Zhang (HoHai University, P.R. China); Yujie Qian (Hohai University, P.R. China)

[O11C-4] A Probabilistic Model of File Transfer Time Based on Markov Chain in Vehicular Ad Hoc Networks
Xinyu Wu, Meiju Yu, and Ru Li (Inner Mongolia University, P.R. China)

[O11C-5] Inductive Coupling Characteristics of Nano-crystalline Alloy for Electric Vehicle PLC
Kyung-Rak Sohn (Korea Maritime and Ocean University, Korea)

July 5, 2018 (Thursday)

[09:20-10:50, Conference Foyer]

Poster Session 1

[P1-1] Hello-Message Transmission-Power Control for Network Self-Recovery in FANETs
Geon-Hwan Kim, Imtiaz Mahmud, and You-Ze Cho (Kyungpook National University, Korea)

[P1-2] Throughput Analysis of Dynamic Multi-Hop Network Under High Traffic Load
Yusuke Sunada (The University of Electro-Communications & Advanced Wireless & Communication Research Center, Japan); Koichi Adachi (The Univeresity of Electro-Communications, Japan); Yasushi Yamao (The University of Electro-Communications, Japan)

[P1-3] Design of Integrated LDM Information for Intersection Safety
Shin-kyung Lee (Etri, Korea); Jeong-woo Lee and Hyun-seo Oh (ETRI, Korea)

[P1-4] Performance Analysis of WAVE Communication for Emergency Broadcasting in Metro Environments
Seong Keun Jin, Soo Hyun Jang, Dae Kyo Shin, Sang Hun Yoon, and Han Gyun Jung (Korea Electronics Technology Institute, Korea)

[P1-5] A Quality Selection Mechanism Using a Deep Q-Network for Seamless Video Streaming Services
Iseul Kim, Seongjun Hong, Sungwook Jung, and Kyungshik Lim (Kyungpook National University, Korea)

[P1-6] Indoor Localization Using Digital Auto Zoom of a Smartphone Camera and Integrated Sensors
Yoonsung Chae, Duy Thong Nguyen, Sangcheol Park, and Youngil Park (Kookmin University, Korea)

[P1-7] A Hybrid Optical Wireless System for Simultaneous Service of VLC and OCC
Duy Thong Nguyen, Yoonsung Chae, Sangcheol Park, and Youngil Park (Kookmin University, Korea)

[P1-8] Performance Improvement of Optical Satellite Communications by Interleaved IEEE 802.11 LDPC
Duy Thong Nguyen and Youngil Park (Kookmin University, Korea)

[P1-9] Delay Analysis of Fixed Multi-Thread Algorithm for DBA in Long Reach PON
Nguyen Khac Binh, Byeong-ho Kang, and Su-il Choi (Chonnam National University, Korea)

[P1-10] Diversity-Controlled Multi-User Superposition Transmission for Uplink Cellular Networks
Jeong Seon Yeom (Chungnam National University, Korea); Han Seung Jang (Korea Advanced Institute of Science and Technology, Korea); Bang Chul Jung (Chungnam National University, Korea)

[P1-11] Validation of MPTCP Performance Enhancement Algorithm in Real PS-LTE Environment
Byunggoo Lee (Yonsei University, Korea); Seungbeom Song (Yonsei University & Electrical & Electronic Engineering, Korea); Seok Ryu and Jaiyong Lee (Yonsei University, Korea)

[P1-12] Low Complexity Beam Searching Algorithm Using Asymptotic Property of Massive MIMO Systems
Heeyoung Kim and Jaemin Jung (University of Yonsei, Korea); Seongbae Han (Yonsei University, Korea); Seokki Kim and Seungkwon Baek (ETRI, Korea); Sooyong Choi (Yonsei University, Korea)

[P1-13] Support for Edge Computing in the 5G Network
Young-il Choi and Noik Park (ETRI, Korea)

[P1-14] A Physical Layer Security-based Transmit Antenna Selection Scheme for NOMA Systems
Kyusung Shim and HyukChun Oh (Hongik University, Korea); Tri Nhu Do (Hongik University, Sejong Campus, Korea); Beongku An (Hongik University, Korea)

[P1-15] Narrow-Band Interference Removing Filter for Mobile Communication Systems
Hoon Kang and Jong-Seon No (Seoul National University, Korea)

[P1-16] Achievable Rate Evaluation by System Level Simulation for mmWave Based Backhaul Network Adopting In-Band Full-Duplex
Seongbae Han (Yonsei University, Korea); Jaemin Jung and Heeyoung Kim (University of Yonsei, Korea); Seokki Kim and Seungkwon Baek (ETRI, Korea); Sooyong Choi (Yonsei University, Korea)

[P1-17] Study on the Effect of LTE on the Coexistence of NB-IoT
JungHoon Oh and Hoyoung Song (ETRI, Korea)

[P1-18] Uplink Scheduling Technique for the LTE System to Improve the Performance of the NB-IoT System
Hyungjin Kim, Seongchul Cho, Junghoon Oh, and Gweondo Jo (ETRI, Korea)

[P1-19] Determination of Optimum Threshold Values for NPRACH Preamble Detection in NB-IoT System
Seongchul Cho, Hyungjin Kim, and Gweondo Jo (ETRI, Korea)

[P1-20] EGE: A New Energy-Aware GPU Based Erasure Coding Scheduler for Cloud Storage Systems
Mehdi Pirahandeh and Deok-Hwan Kim (Inha University, Korea)

[P1-21] User Space Customized Recommendation Service Platform System in Mobile Edge Environment
Eungha Kim (ETRI, Korea)

[P1-22] Efficient Slice Allocation for Novel 5G Services
Min Kyung Lee and Choong Seon Hong (Kyung Hee University, Korea)

[P1-23] A Study on D2D Caching Systems with Mobile Helpers
Soyi Kim, Eulhyeon Go, YoonSeok Song, HyungJoon Cho, and Minjoong Rim (Dongguk University, Korea); Chung G. Kang (Korea University, Korea)

[P1-24] Threshold Secret Sharing Transmission Against Passive Eavesdropping in MIMO Wireless Network
Jungho Myung (Electronics and Telecommunications Research Institute, Korea); Taehong Kim (Chungbuk National University, Korea)

[P1-25] Performance Test of LTE-R Railway Wireless Communication at High-Speed (350 km/h) Environments
Sung-Hun Lee (Kwangwoon University, Korea); Mahn-suk Yoon, Chang-Kyo Lee, Soo-Hyun Cho, and Wan-jin Ko (Gumi Electronics and Information Technology Research Institute, Korea)

[11:10-12:40, Conference Foyer]

Poster Session 2

[P2-1] Mobility Modeling and Analysis in Mobile Communication Networks
Hee-Seon Jang (Pyeongtaek University, Korea)

[P2-2] Efficient Data Delivery Protocol Using Vehicle Mobility Information in VANETs
Yongje Shin, Hyun-seok Choi, Youngju Nam, and Euisin Lee (Chungbuk National University, Korea)

[P2-3] Efficient Deployment of Service Function Chains (SFCs) in a Self-Organizing SDN-NFV Networking Architecture to Support IOT
Kwang-Man Ko (Sangji University, Korea); Ali Mohammed Mansoor (Universiti Malaya & Computer Science and IT, Malaysia); Rodina Ahmad (Universiti Malaya, Malaysia); Soon-Gohn Kim (Joongbu University, Korea)

[P2-4] Reservation-Based Cooperative Intersection Crossing Scheme for Autonomous Driving in the Intersection
Myungwhan Choi and Areeya Rubenecia (Sogang University, Korea); Hyo Hyun Choi (Inha Technical College, Korea)

[P2-5] Maximal Ratio Combining for Long-Range Underwater Acoustic Communication in East Sea
Hyeonsu Kim, Sunhyo Kim, Kang-Hoon Choi, and Jee Woong Choi (Hanyang University, Korea); Ho seuk Bae (Agency for Defense Development, Korea)

[P2-6] Underwater Acoustic Communication Using Vector Sensor in KOREX-17
Sunhyo Kim, Hyeonsu Kim, Kang-Hoon Choi, and Jee Woong Choi (Hanyang University, Korea); Su-Uk Son (Agency for Defense Development, Korea)

[P2-7] Investigating Influence of North Korea Threat Events on Attractiveness of South Korea for Foreign Visitors through Big Data Analysis
Kyung Jin Cha, Elizaveta Srednik, and Hwa Jong Kim (Kangwon National University, Korea)

[P2-8] NFV-Based Mobile Edge Computing for Lowering Latency of 4K Video Streaming
Linh Van Ma (Chonnam National University, Korea); Van Quan Nguyen (Chonnam National University & SMMC Lab, Korea); Jaehyung Park and Jinsul Kim (Chonnam National University, Korea)

[P2-9] Semantic Ontology-based NFV Service Modeling
Sang il Kim (KwangWoon University, Korea); Hwa Sung Kim (Kwangwoon University, Korea)

[P2-10] Viewport Prediction Method of 360 VR Video Using Sound Localization Information
Eunyoung Jeong, Dongho You, Changjong Hyun, Bong-Seok Seo, Namtae Kim, Dong Ho Kim, and Ye Hoon Lee (Seoul National University of Technology, Korea)

[P2-11] MPEG-DASH MPD for Tile-based Hybrid Stereoscopic 360-Degree Video Streaming
Dongho You, Eunyoung Jeong, and Dong Ho Kim (Seoul National University of Science and Technology, Korea)

[P2-12] LED Color Detection of Visual-MIMO System Using Boosting Neural Network Algorithm
Partha Pratim Banik, Rappy Saha, Tae-Ho Kwon, and Ki-Doo Kim (Kookmin University, Korea)

[P2-13] An Effective Classification for DoS Attacks in Wireless Sensor Networks
Thi-Thu-Huong Le, Taehwan Park, Dongkeun Cho, and Howon Kim (Pusan National University, Korea)

[P2-14] DDoS Mitigation: Decentralized CDN Using Private Blockchain
Kyoungmin Kim, Youngin You, Mookyu Park, and Kyungho Lee (Korea University, Korea)

[P2-15] Route Plan Exchange Scheme Based on Block Chain
Doyoung Chung and Hae Sook Jeon (ETRI, Korea)

[P2-16] Authentication Protocol for Wearable Devices Using Mobile Authentication Proxy
Doo-Hee Hwang, Jin-Myeong Shin, and Yoon-Ho Choi (Pusan National University, Korea)

[P2-17] Parallel Implementation of Simeck Family Block Cipher by Using ARM NEON
Taehwan Park (Pusan National University, Korea); Hwajeong Seo (Hansung University, Korea); Chanhui Park and Howon Kim (Pusan National University, Korea)

[P2-18] Detection And Countermeasures of DDoS Attacks in Cloud Computing
Mahmoud Said Elsayed (Nile University, Egypt); Marianne Azer (National Telecommunication Institute + Nile University, Egypt)

[P2-19] A Low Overhead Feedback Scheme of Channel Covariance Matrix for Massive MIMO Systems
Youngrok Jang, Dongheon Lee, and Sooyong Choi (Yonsei University, Korea)

[P2-20] A Study on the Wi-Fi Radio Signal Attenuation In Various Construction Materials (Obstacles)
Tatyana Golubeva, Yevgeniy Zaitsev, Sergey Konshin, and Inkar Duisenbek (Almaty University of Power Engineering and Telecommunications, Kazakhstan)

[P2-21] A Novel Dimming Approach for Both TRIAC and Wall Switch LED Lighting Systems
Yuan-Ta Hsieh, Chi-Feng Su and Hann-Huei Tsai (National Chip Implementation Center, Taiwan); Ying-Zong Juang (Chip Implementation Center, National Applied Research Laboratories, Taiwan)

[14:00-15:30, Conference Foyer]

Poster Session 3

[P3-1] Hop Count Measurement Between Autonomous Systems Using a Combination of Active and Passive Monitoring
Nematullo Rahmatov, Hyeonwoo Kim, Meryam Essaid, and Hongtaek Ju (Keimyung University, Korea); Wooguil Pak (Keimyung Univ, Korea)

[P3-2] Research on Estimation of Equipment Sizing for Network Deployment
Geunwoo Park, Sohee Jin, Haeng-in Kim, Chan-ju Lee, and Moon-kil Lee (Telecommunications Technology Association, Korea)

[P3-3] Software Defined Radio Controller Using Bluetooth
Hyoseok Yoon, Saet-Byeol Yu, and Se-Ho Park (Korea Electronics Technology Institute, Korea)

[P3-4] Free-viewpoint Relationship Description Based Streaming Systems for Arbitrary View Switching
Seulki Song (KETI, Korea); Yonghwan Kim (Korea Electronics Technology Institute, Korea); Yong-Suk Park (Korea Electronics Technology Institute & Yonsei University, Korea); JungWook Wee (Korea Electronics Technology Institute, Korea)

[P3-5] Encapsulation Methods for Stable Free-viewpoint Video Streaming Service
Minjae Seo and Jong-Ho Paik (Seoul Women's University, Korea)

[P3-6] Initial Beam Selection Scheme Using Channel Correlation Matrix for mmWave Massive MIMO Systems
Jaemin Jung, Heeyoung Kim, Seongbae Han, and Youngrok Jang (Yonsei University, Korea); Seokki Kim and Seungkwon Baek (ETRI, Korea); Sooyong Choi (Yonsei University, Korea)

[P3-7] Research on Pedestrian Detection Based on Faster R-CNN and Hippocampal Neural Network
Biao Hao, Su-Bin Park, and Dae-Seong Kang (Dong-A University, Korea)

[P3-8] Indoor Localization with WiFi Fingerprinting Using Convolutional Neural Network
Jin-Woo Jang and Song-Nam Hong (Ajou University, Korea)

[P3-9] Multi-Source Localization Using Linear DoA Sensor Network
Hyoungsoo Lim and Cheon Sig Sin (ETRI, Korea)

[P3-10] A Study on the Traffic Light Identification and Guidance System for the Elderly Drivers
Myeon-gyun Cho and Zhafri Hariz Roslan (Semyung University, Korea)

[P3-11] Optical Spectrum Estimation Technique for Optical Interference Cancellation in High Speed Transmission MISO-OCVLC Environment
Doohee Han (Kyung Hee University, Korea); Kyujin Lee (Semyung University, Korea)

[P3-12] An Analysis of an RF Link Budget and RSSI Circuit Design for Long-Range Communications
Kyong-Hee Lee (ETRI, Korea)

[P3-13] A Pilot-based Beam-Tracking Technique for OFDM-based Millimeter-Wave Cellular Systems
Yong Soo Cho (Chung-Ang University, Korea); Yeong Jun Kim (LG Electronics, Korea)

[P3-14] Optimization of CHAM Encryption Algorithm Based on Javascript
Chanhui Park and Taehwan Park (Pusan National University, Korea); Hwajeong Seo (Hansung University, Korea); Howon Kim (Pusan National University, Korea)

[P3-15] Service Mediation Gateway for Heterogenous IoT Services Harmonization
Seung Woo Kum and Jaewon Moon (Korea Electronics Technology Institute, Korea)

[P3-16] An Efficient WOLA Structured OQAM-FBMC Transceiver
Jae Hoon Park and Won Choel Lee (Soongsil University, Korea)

[P3-17] Compatibility of Heterogeneous Devices Based on 2.5G Base-T
So-Ki Jung (aSSIST & SKbroadband Company, Korea)

[P3-18] A Feature Based Content Analysis of Blockchain Platforms
Suntae Kim (Chonbuk National University, Korea); Sooyong Park (Sogang University, Korea); YoungBeom Park (Dankook University, Korea); JeongAh Kim (Catholic Kwandong University, Korea); Young-Hwa Cho and Jae-young Choi (Sungkyunkwan University, Korea); Chin-Chol Kim (NIA(National Information Society Agency), Korea)

[P3-19] A Parallel Artificial Neural Network Learning Scheme Based on Radio Wave Fingerprint for Indoor Localization
Yong-Hoon Choi and Chan Uk Park (Kwangwoon University, Korea)

[P3-20] Integration of Contourlet Transform and Canny Edge Detector for Brain Image Segmentation
Lata Ayesha Akter and Goo-Rak Kwon (Chosun University, Korea)

[P3-21] Color Medical Image Encryption Using Two-dimensional Chaotic Map and C-MLCA
Hyun-soo Jeong, Sung-jin Cho, Kyu-Chil Park, and Seok-tae Kim (Pukyong National University, Korea)

[P3-22] Throughput Improvement by Using Dynamic Channel Selection in 2.4 GHz Band of IEEE 802.11 WLAN
Kavita Mathur, Diganta Jena, Sandeep Agrawal, Suja Baburaj, Sridhar Kondabathini, and Vipin Tyagi (Centre For Development of Telematics, India)

[P3-23] Study on an Energy-IoT Service Platform for Energy Saving in Legacy Manufacturing Site
Hyo-Sub Choi and Kyeo-Rae Yeom (KETI(Korea Electronics Technology Institute), Korea)

[P3-24] Prediction of Manufacturing Plant's Electric Power Using Machine Learning
Kyeo-Rae Yeom and Hyo-Sub Choi (KETI(Korea Electronics Technology Institute), Korea)

[P3-25] A TOTP-Based Two Factor Authentication Scheme for Hyperledger Fabric Blockchain
Woo-Suk Park, Dong-Yeop Hwang, and Ki-Hyung Kim (Ajou University, Korea)

[16:00-17:30, Conference Foyer]

Poster Session 4

[P4-1] Consideration of Constraints in Communication Terminal Devices Due to an Installed Environment of Sensor Networks
Seokjin Lee, Hong-Soon Nam, and Youn-Kwae Jeong (ETRI, Korea)

[P4-2] Demand Response Operation Method on Energy Big Data Platform
Tai-Yeon Ku, Wan-Ki Park (ETRI, Korea), and Hoon Choi (Chungnam National University)

[P4-3] Korean Sign Language Translation Using Machine Learning
Angela Caliwag, Stephen Ryan Angsanto, and Wansu Lim (Kumoh National Institute of Technology, Korea)

[P4-4] A Novel Resource Sharing Mechanism for Device-to-Device Communications Underlaying LTE-A Uplink Cellular Networks
Devarani Devi Ningombam, Suk-seung Hwang, and Seokjoo Shin (Chosun University, Korea)

[P4-5] Study of Analyzing and Mitigating Vulnerabilities in uC/OS Real-Time Operating System
Myeonggeon Lee, Gwangjun Choi, Junsang Park, and Seong-je Cho (Dankook University, Korea)

[P4-6] Situational Awareness Framework for Cyber Crime Prevention Model in Cyber Physical System
Minhee Joo, Junwoo Seo, Junhyoung Oh, Mookyu Park, and Kyungho Lee (Korea University, Korea)

[P4-7] Spectrogram-Based Automatic Modulation Recognition Using Convolutional Neural Network
Sinjin Jeong, Uhyeon Lee, and Suk Chan Kim (Pusan National University, Korea)

[P4-8] hyperCache: A Hypervisor-Level Virtualized I/O Cache on KVM/QEMU
Jaechun No and Taehoon Kim (Sejong University, Korea); Sung-soon Park (Anyang University, Korea); Seungho Choi (Sejong University, Korea)

[P4-9] Link Level Simulation of MHN-E System
Sung-Woo Choi and Ilgyu Kim (ETRI, Korea)

[P4-10] Design & Implementation of Real-time Parallel Image Processing Scheme on Fire-Control System
Chang Bae Moon, Byeong Man Kim, and Dong-Seong Kim (Kumoh National Institute of Technology, Korea)

[P4-11] Development of Visual Inspection System for Assembly Machine
Jeonghong Kim (Kyungpook National University, Korea)

[P4-12] Convolution Neural Network-based Spectrum Sensing for Cognitive Radio Systems Using USRP with GNU Radio
Gyu-Hyung Lee, Young-Doo Lee, and In-Soo Koo (University of Ulsan, Korea)

[P4-13] Convolutional Autoencoder-based Sensor Fault Classification
Jae-Wan Yang, Young-Doo Lee, and In-Soo Koo (University of Ulsan, Korea)

[P4-14] Video Surveillance System Based on 3D Action Recognition
Sungjoo Park and Dongchil Kim (Korea Electronics Techonlogy Institute (KETI), Korea)

[P4-15] A Study on Face Masking Scheme in Video Surveillance System
Dongchil Kim and Sungjoo Park (KETI, Korea)

[P4-16] Learning Through Adverse Event for Collision Avoidance: A Self-Learning Approach
Hyunjun Han, Jusung Kang, Muhammad Asif Raza, and Heung-No Lee (Gwangju Institute of Science and Technology, Korea)

[P4-17] Malicious activity against an HPC service environment exhibits a power-law-like frequency distribution
Jae-Kook Lee, Sung-Jun Kim, Taeyoung Hong, Minsu Joh, and Huiseung Chae (Korea Institute of Science and Technology Information, Korea)

[P4-18] Design and Comparison of Discrete Wavelet Transform Based OFDM (DWT-OFDM) System
Jun-Gu Lee and Heung-Gyoon Ryu (Chungbuk National University, Korea)

[P4-19] Outdoor Demonstration of 5Gbps MHN Enhanced System
Dae-Soon Cho (ETRI, Korea)

[P4-20] A Cluster-based Content Management Framework for Information-Centric Networking
Kamrul Hasan and Seong-Ho Jeong (Hankuk University of Foreign Studies, Korea)

[P4-21] Classification of Radar Signals with Convolutional Neural Networks
Seok-Jun Hong and Bo-Seok Seo (Chungbuk National University, Korea)

[P4-22] An Automated System Recovery Using BlockChain
Suhwan Bae and Yongtae Shin (Soongsil University, Korea)

[P4-23] Study on Simplified Test Bench for QoS Analysis Using Traffic Models of Pre-5G Service
Sung-Hun Lee (Kwangwoon University, Korea); Mahn-suk Yoon, Soo-Hyun Cho and Hyun-Kyu Cho (Gumi Electronics & Information Technology Research Institute, Korea)

[P4-24] The Systematic Survey for IP Traceback Methods
Tian Hongcheng (Institute of Network Science & Cyberspace, Tsinghua University, P.R. China); Jun Bi (Tsinghua University, P.R. China)

[P4-25] RESTful Interfaces for Application Initiated D2D Communications
Evelina Pencheva, Ivaylo Atanasov, Denitsa Kireva, and Vencislav Trifonov (Technical University of Sofia, Bulgaria)

Grandior Hotel Prague

Web Site : http://www.hotel-grandior.cz/en/

Location : Prague, Czech Republic

Hotel information :

Grandior Hotel Prague is the new design hotel perfectly situated in the city centre of Prague. Such attractions of the historic Prague Old Town, like Astronomical Clock on the Old Town Hall, Municipal House on Square of Republic or Charles Bridge, Powder Tower, Music Theatre Karlin and many others are in the immediate walking vicinity, making this hotel a great choice for all travelers. Hotel guests enjoy easy access to public transport and the central train station. Subway (Station Florenc, metro line B + C) or tram stops are just around the corner and parking is right in this place.

Hotel address :

Na Porici 42, Prague 1

Contact Information

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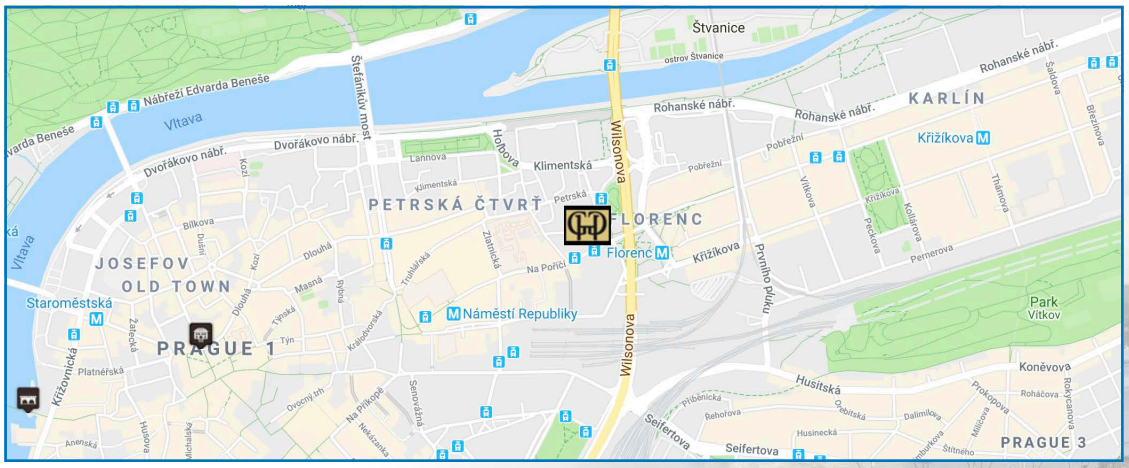


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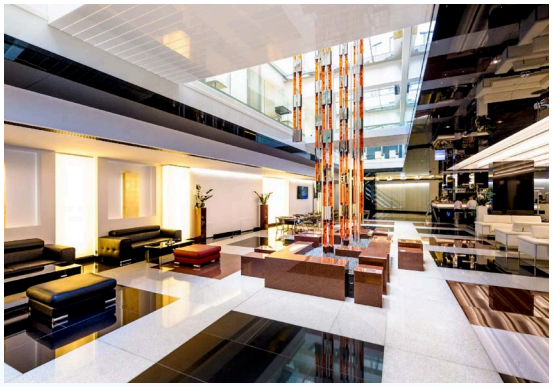

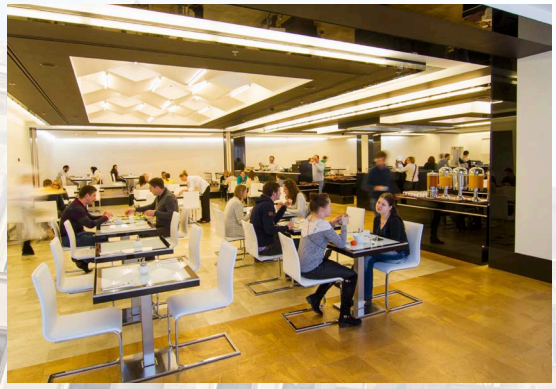


CONCIERGE

Old Town Square

At the heart of Prague's Old Town, this majestic and extremely popular by tourists square with its colorful baroque houses is located just between the famous Wenceslas Square and Charles Bridge. The square presents several architectural styles such as gothic of the Týn Church or baroque architecture of the St. Nicholas Church. Many tourists come here to see the medieval Astronomical Clock built on top of the Town's Hall that provides a musical show every hour from 8:00 Am to 8:00 PM. The Astronomical Clock, which now proudly symbolizes Prague, was originally build in 1410 which makes it the oldest working astronomical clock in the world. The various signs on the clock stand for the phases of the moon, the seasons and also for some of the Christian holidays. You may want to climb up to the Old Town Hall's tower to get a magnificent view of Staromestské námestí but keep in mind that the climb may be challenging as the steps are quite narrow and steep. If you're not fit for that, taking the elevator may be a good alternative. As a day visit is a must, you may want to return at night time if only to have a look at the baroque buildings as they are lighted by the towers of the Týn church.

Týn Church

Tyn church, also called the Church of Our Lady Before Tyn, is located in Prague's Old Town Square while the towers or spires of the church can be seen from most everywhere in Prague. The church was renovated between the years 1975 through 1993 and is now structurally sound and in good condition. The Tyn Church was built in 1385 by the Hussites, which were actively being slaughtered by Roman Catholics. The Catholic Jesuits later took over the Tyn Church and replaced the old bell with a large statue of Mary placed between the two large towers. Those two towers are not symmetrical and represent the male and female parts of the world, with the larger side representing the masculine side. The Gothic influence of building cannot be missed and some say that this church is the model for Walt Disney's Sleeping Beauty castle.

Old Jewish Cemetery

A very popular tourist attraction in Prague is one of Europe's oldest Jewish cemeteries. It is located the Josefov, the Jewish Quarter, one block away from the famous Old-New Synagogue and holds around 12,000 visible tombstones in a small yard which are only a small part out of the thousands of graves buried below. The reason is the rules published from the 15th century to 1787 by the rulers of Prague that did not allow for Jews to bury their dead anywhere else. The lack of space caused the graves to be piled one on top of the other. There are two significant graves here - the oldest, which belongs to one Avigdor Kara (a poet), who died according to the records in 1439 and the well-known grave of Jehuda ben Bezalel who is known for creating the "Golem of Prague".

Charles Bridge

Once the most important bridge for commerce, the Charles Bridge in Prague is still very important, but now it is primarily significant for tourism. This beautiful cobblestone bridge is lined with intricate statues and lamp posts on either side. It crosses the river VItava to the Prague Castle, and was named for King Charles IV who commissioned its building. The view from this bridge of both the city skyline and the river below it are stunning. Visitors are welcome and encouraged to walk across the bridge as it is now a pedestrian road. Musicians, street performers, artists and other vendors line the street during the busiest times of the day. The quietest times are early morning and late evening. This is a don't miss spot in Prague.

Franz Kafka Museum

A museum in Malá Strana (Lesser Town), Prague which is dedicated the work of this great Jewish author. Frantz Kafka was born here and although he actually wrote in German he did spend most of his life here and it is Prague that symbolizes best of all cities his unique attitude towards life. The museum presents various photos, diaries, documents and letters of Kafka and tries to bring the visitor into his mind through the creation of a special "Kafka" dark atmosphere.

Prague Castle

On a hilltop west of the VItava River, resided what is perceived by many as Prague's number one tourist attraction – the Prague Castle. What is called "The Prague Castle" is actually a huge complex of buildings connected by internal courtyards and built throughout the last 1000 years. It therefore provides a great opportunity to visit, in a relatively small location many architectural styles of the last millennium. An exploration of the castle can take anything between half a day and a full day, depending on how well you want to explore it. The main sights within the Castle are St. Vitus Cathedral, St. George's Basilica, the Royal Palace, the Powder Tower, and of course the Golden Lane in which Frantz Kafka used to live for a while. If you are interested in doing a little climb up the road, you can certainly walk up directly to the castle from Charles Bridge. Alternatively, it is also possible to use metro line A to Malostranská followed by tram no. 22 north (two stops) to "Prazský hrad".

Memo

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