

**The 15th International Conference on
Future Information Technology
(FutureTech 2020)
&
The 14th International Conference on
Multimedia and Ubiquitous Engineering
(MUE 2020)**

August 17-19, 2020
Jeju, Korea

Organized by

FutureTech, MUE & KIPS CSWRG



2020 International Conferences
(Sponsored / Technically Sponsored by KIPS / KIPS CSWRG)

The 12th International Conference on Computer Science and its Applications (CSA 2020)

- December, 14-16, 2020, Seoul, Korea
- <http://www.csa-conference.org/2020>

Message from the FutureTech 2020 General Chairs

FutureTech 2020 is the 15th event of the series of international scientific conference. This conference takes place on August 17-19, 2020 in Jeju, Korea. The aim of the FutureTech 2020 is to provide an international forum for scientific research in the technologies and application of information technology. FutureTech 2019 is the next edition of FutureTech2019(Xian, China), FutureTech2018 (Salerno, Italy), FutureTech2017 (Seoul, Korea), FutureTech2016 (Beijing, China), FutureTech2015 (Hanoi, Vietnam), FutureTech2014 (Zhangjiajie, China), FutureTech2013 (Gwangju, Korea), FutureTech2012 (Vancouver, Canada), FutureTech2011 (Loutraki, Greece), FutureTech2010 (Busan, Korea, May 2010) which was the next event in a series of highly successful the International Symposium on Ubiquitous Applications & Security Services (UASS-09, USA, Jan. 2009), previously held as UASS-08 (Okinawa, Japan, Mar. 2008), UASS-07 (Kuala Lumpur, Malaysia, August, 2007), and UASS-06 (Glasgow, Scotland, UK, May, 2006).

The conference papers included in the proceedings cover the following topics: Hybrid Information Technology, High Performance Computing, Cloud and Cluster Computing, Ubiquitous Networks and Wireless Communications, Digital Convergence, Multimedia Convergence, Intelligent and Pervasive Applications, Security and Trust Computing, IT Management and Service, Bioinformatics and Bio-Inspired Computing, Database and Data Mining, Knowledge System and Intelligent Agent, Game and Graphics, and Human-centric Computing and Social Networks. Accepted and presented papers highlight new trends and challenges of future information technologies. We hope readers will find these results useful and inspiring for their future research.

We would like to express our sincere thanks to Steering Chair: James J. (Jong Hyuk) Park (SeoulTech, Korea) and Young-Sik Jeong (Dongguk University, Korea). Our special thanks go to the Program Chairs: Giuseppe Fenza(University of Salerno, Italy), Guangchun Luo(University of Electronic Science and Technology of China, China), China Ching-Hsien Hsu(Chung Hua University, Taiwan), Houcine Hassan(Universitat Politècnica de Valencia, Spain), Jin Wang(Yangzhou University, China), Yan Li(Inha University, Korea), Ying Xia(Chongqing University of Posts and Telecommunications, China), Qinghua Zhang(Chongqing University of Posts and Telecommunications, China), Yi Jiang(Chongqing University of Posts and Telecommunications, China), Xu Zhang(Chongqing University of Posts and Telecommunications, China), all Program Committee members, and all reviewers for their valuable efforts in the review process that helped us to guarantee the highest quality of the selected papers for the conference.

We cordially thank all the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Thanks are also due to the many experts who contributed to making the event a success.

FutureTech 2020 General Chairs

Kim-Kwang Raymond Choo, The University of Texas at San Antonio, USA
Jiannong Cao, The Hong Kong Polytechnic University, Hong Kong
Jungho Kang, Baewha Women's University, Korea

Message from the FutureTech 2020 Program Chairs

Welcome to the 14th International Conference on Future Information Technology (FutureTech 2020), which will be held in Jeju, Korea on August 17-19, 2020. FutureTech 2020 will be the most comprehensive conference focused on the various aspects of information technologies. It will provide an opportunity for academic and industry professionals to discuss recent progress in the area of future information technologies. In addition, the conference will publish high quality papers which are closely related to the various theories and practical applications in multimedia and ubiquitous engineering. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in these important subjects.

For FutureTech 2020, we received many paper submissions, after a rigorous peer review process, we accepted only articles with high quality for the FutureTech 2020 proceedings, published by the Springer. All submitted papers have undergone blind reviews by at least two reviewers from the technical program committee, which consists of leading researchers around the globe. Without their hard work, achieving such a high-quality proceeding would not have been possible. We take this opportunity to thank them for their great support and cooperation. Finally, we would like to thank all of you for your participation in our conference, and also thank all the authors, reviewers, and organizing committee members. Thank you and enjoy the conference!

FutureTech 2020 Program Chairs

Giuseppe Fenza, University of Salerno, Italy
Guangchun Luo, University of Electronic Science and Technology of China, China
China Ching-Hsien Hsu, Chung Hua University, Taiwan
Houcine Hassan, Universitat Politècnica de València, Spain
Jin Wang, Yangzhou University, China
Yan Li, Inha University, Korea
Ying Xia, Chongqing University of Posts and Telecommunications, China
Qinghua Zhang, Chongqing University of Posts and Telecommunications, China
Yi Jiang, Chongqing University of Posts and Telecommunications, China
Xu Zhang, Chongqing University of Posts and Telecommunications, China

Organization

Honorary Chair

Doo-soon Park, SoonChunHyang University, Korea
Guanghong Xu, Chongqing University of Posts and Telecommunications, China

Steering Chairs

James J. Park, SeoulTech, Korea
Young-Sik Jeong, Dongguk University, Korea

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Yan Li, Inha University, Korea
Ying Xia, Chongqing University of Posts and Telecommunications, China
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Xu Zhang, Chongqing University of Posts and Telecommunications, China

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Ping-Feng Pai, Nation Chi Nan University, Taiwan
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Emily Su, Taipei Medical University, Taiwan

Workshop Chair

Jun-Ho Huh, Catholic University of Pusan, Korea

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Maumita Bhattacharya, Charles Sturt University, Australia

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Carson Leung, University of Manitoba, Canada
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Pichappan Pit, Zhejiang University, China
Caldelli Roberto, University of Florence, Italy
Salem Abdelbadeeh, Ain Shams University, Egypt
Zeyar Aung, Khalifa University, UAE
Raylin Tso, National Chengchi University, Taiwan
Wookey Lee, Inha University, Republic of Korea
Neruda Roman, Czech Academy of Sciences, Czech Republic
Sudeep Tanwar, Nirma University, India
Klyuev Vitaly, University of Aizu, Japan

Message from the MUE 2020 General Chairs

MUE 2020 is the 14th event of the series of international scientific conference. This conference takes place on August 17-19, 2020 in Jeju, Korea. The aim of the MUE 2020 is to provide an international forum for scientific research in the technologies and application of Multimedia and Ubiquitous Engineering. Ever since its inception, International Conference on Multimedia and Ubiquitous Engineering has been successfully held as MUE-19(Xian, China), MUE-18 (Salerno, Italy), MUE-17 (Seoul , Korea), MUE-16 (Beijing, China), MUE-15 (Hanoi, Vietnam), MUE-14 (Zhangjiajie, China), MUE-13 (Seoul, Korea), MUE-12 (Madrid, Spain), MUE-11 (Loutraki, Greece), MUE-10 (Cebu, Philippines), MUE-09 (Qingdao, China), MUE-08 (Busan, Korea), and MUE-07 (Seoul, Korea).

The conference papers included in the proceedings cover the following topics: Multimedia Modeling and Processing, Multimedia and Digital Convergence, Ubiquitous and Pervasive Computing, Ubiquitous Networks and Mobile Communications, Ubiquitous Networks and Mobile Communications, Intelligent Computing, Multimedia and Ubiquitous Computing Security, Multimedia and Ubiquitous Services, Multimedia Entertainment. Accepted and presented papers highlight new trends and challenges of Multimedia and Ubiquitous Engineering. We hope readers will find these results useful and inspiring for their future research.

We would like to express our sincere thanks to Steering Chair: James J. (Jong Hyuk) Park (SeoulTech, Korea). Our special thanks go to the Program Chairs: Fei Hao(Shaanxi Normal University, China), Ka Lok Man(Xi'an Jiaotong-Liverpool University, China), Wei Song(North China University of Technology, China), Joon-Min Gil(Catholic University of Daegu, Korea), all Program Committee members and all reviewers for their valuable efforts in the review process that helped us to guarantee the highest quality of the selected papers for the conference.

MUE 2020 General Chairs

Vincenzo Loia, University of Salerno, Italy
Yi Pan, Georgia State University USA
Yunsick Sung, Dongguk University-Seoul, Korea

Message from the MUE 2020 Program Chairs

Welcome to the 14th International Conference on Multimedia and Ubiquitous Engineering (MUE 2020), which will be held Jeju, Korea on August 17-19, 2020. MUE 2020 will be the most comprehensive conference focused on the various aspects of multimedia and ubiquitous engineering. It will provide an opportunity for academic and industry professionals to discuss recent progress in the area of multimedia and ubiquitous environment. In addition, the conference will publish high quality papers which are closely related to the various theories and practical applications in multimedia and ubiquitous engineering. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in these important subjects.

For MUE 2020, we received many paper submissions, after a rigorous peer review process, we accepted only articles with high quality for the MUE 2020 proceedings, published by the Springer. All submitted papers have undergone blind reviews by at least two reviewers from the technical program committee, which consists of leading researchers around the globe. Without their hard work, achieving such a high-quality proceeding would not have been possible. We take this opportunity to thank them for their great support and cooperation. Finally, we would like to thank all of you for your participation in our conference, and also thank all the authors, reviewers, and organizing committee members. Thank you and enjoy the conference!

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Ka Lok Man, Xi'an Jiaotong-Liverpool University, China
Wei Song, North China University of Technology, China
Joon-Min Gil, Catholic University of Daegu, Korea

Organization

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Pradip Shama, SeoulTech, Korea

Workshop Chair

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Pascal Lorenz, University of Haute Alsace, France
Anand Nayyar, Da Nang, Viet Nam
Sokratis Katsikas, Open University of Cyprus, Cyprus
Francisco Jose Monaco, University of Sao Paulo, Brazil

Invited Speaker



Current status of ICT Education for National University of Laos

Somphone KANTHAVONG, Ph.D.

Head of Department

Department of Computer Engineering and Information Technology, Faculty of Engineering

National University of Laos, Laos

Abstract

National University of Laos "NUOL" was established by merging the higher education institutes which were under the supervision of several ministries into one university under the Ministry of Education and sports. NUOL has played 4 roles in 1) providing higher education in areas required for the socio-economic development of Laos; 2) performing research in natural and social sciences; 3) preserving the arts, culture and traditions of the nation; and 4) providing academic services to society. It is known for its diversity programs in Bachelor degrees; Master degree programs are conducted in its academic disciplines, and some Doctoral degree programs, as well. In modernization of the university toward digital-based university in the future. NUOL is upgraded for ICT roles to 1) Develop and Manage the ICT infrastructure in the whole university, 2) Develop ICT human resource toward "ICT based society", 3) Supporting and Doing research in the field of Computer Science, Computer Engineering and ICT, and 4) to provide academic services. For strengthening the ICT system in line with the University ICT Development Plan, The ICT Development plan of university is adjusted or improved almost every year in order to catch up with the Rapid pace of the technology. However, it is hard in order to take it into action due to insufficient budget for investment itself. 2011, Since the project called "ASEAN Cyber University" which continuously support by the Republic of Korea, the e-Learning has been being done in NUOL. In addition, Lao IT Business Incubation Center (LIBIC) is also one of the core activities and will be identified in this talk.

Professional Experience Record:

- From 1987-1996 : Lecture at Electronic and Electrical College, Ministry of Education and sports
- From 1996-2004 : professor at Department of Electronic and Telecommunication Engineering, Faculty of Engineering, National University of Laos
- From 2004-2008 : Director of Lao-Japan Technical Training Center, Faculty of Engineering, National University of Laos
- From 2008-present : Head of Department of Computer Engineering and Information Technology, Faculty of Engineering, National University of Laos

Research Area:

- QoS Based Routing Algorithm with Crank-Back Ability. International Conference on Control, Automation and System (ICCAS 2003)
- Optical-Quantum Security using Dark-Bright Solution Conversion in a Ring Resonator System, Procedia Engineering
- Evaluation of Medical Ultrasonic Echo Image Quality for No-Reference Image, Regional Conference on Information and Communication Technology
- Intelligent for 3D Localization Supported visitor Tracking Service in Lao's Museum RCCIE-2013,
- Image Quality Criterion of Ultrasonic Echo Image using Standard Deviation, JICTEE 2014
- Smart Tracking System Applied for Lao's Museum using RFID Technology based on Fingerprint Technique
- A Context-Aware Application for Controlling Multi-sensors to Monitor Energy Use in Rooms, The 3rd International Conference on Big Data Applications and services

PROGRAM Schedule for FutureTech2020 & MUE2020

Day 1, Aug. 17, 2020			
Time	Min	HALL A	HALL B
08:40-09:00	20	Registration	
09:00-10:20	80	Session A-1 BIC2020 Chair :	Session B-1 FT2020/MUE2020 Chair:
10:20-10:30	10	Coffee Break	
10:30-11:50	80	Session A-2 BIC2020 Chair :	Session B-2 FT2020/MUE2020 Chair: Byoungwook Kim
11:50-13:00	70	Lunch Keynote Speech: Somphone KANTHAVONG, Ph.D. "Current status of ICT Education for National University of Laos" Chair :	
13:00-13:30	30	Coffee Break	
13:30-13:40	10		
13:40-15:00	80	Session A-3 BIC2020 Chair :	Session B-3 FT2020/MUE2020 Chair: KeeHyun Park
15:00-15:10	10	Coffee Break	
15:10-16:30	80	Session A-4 HCIS Workshop2020 Chair :	Session B-4 BIC2020/FT2020/MUE2020 Chair: Jin Gon Shon
16:30-16:40	10	Coffee Break	
16:40-18:00	80	Session A-5 HCIS Workshop2020 Chair :	Session B-5 BIC2020/FT2020/MUE2020 Chair:

Day 2, Aug. 18, 2020		
Time	Min	HALL A
09:00-10:30	90	Session A-6 HCIS Workshop2020 Chair :
10:30-10:40	10	Coffee Break
10:40-12:10	90	Session A-7 BIC2020/FT2020/MUE2020 Chair :

Day 3, Aug. 19, 2020		
Time	Min	HALL -A
10:00-12:00	120	Organizing Committee Meeting (Only for Invited Members)
13:00-15:00	120	Local Arrangement Committee Meeting (Only for Invited Members)
16:00-17:30	90	Executive Meeting - Organized by BIC2020, FT2020, MUE2020 (Only for Invited Members)

1. A paper presentation should be made by one of authors of the paper for 15 minutes. (10 minutes for the presentation itself and 5 minutes for Q/A)
2. All speakers of each session should meet the session chair at their room 10 minutes before the session begins.
3. Windows 7 laptops running the Adobe Reader and Microsoft Office for paper presentations will be prepared. Please prepare for your presentation.

DETAILED SCHEDULE FOR
The 15th International Conference on Future Information
Technology (FutureTech 2020)
And
The 14th International Conference on
Multimedia and Ubiquitous Engineering
(MUE 2020)

Day 1, Aug. 17, 2020 (Monday)

08:40-09:00 Registration

09:00-10:20 Session A-1 : BIC2020
(HALL A)
(Chair:)

1. **Electrostatic Coupling Intra-Body Communication Based on Frequency Shift Keying and Error Correction for Asynchronous Clock-less IoT Applications**
Seongho Cho, Sanghoon Lee and Daejin Park
2. **A Deep Learning Approach for Identifying User Interest from Targeted Advertising**
Wonkyung Kim, Kukheon Lee, Hongkyun Kwon, Gimin Hur, Hoyong Choi, Sangjin Lee, Doowon Jeong
3. **Forensic Analysis of Storage Space: RAID System on Windows**
Junho Kim, Jonghyun Choi, Sangjin Lee, Doowon Jeong
4. **PicTalky: Deep learning-based speech therapy platform for developmental disabilities**
Chanjun Park, Yanghee Kim, Yoonna Jang, Umadevi G.R, Heuseok Lim
5. **Accuracy-Power Controllable LiDAR Sensor for Autonomous Vehicles using an Algorithm of Variable Resolution**
Sanghoon Lee, Dongkyu Lee, Seongho Cho, Pyung Choi and Daejin Park

09:00-10:20 Session B-1 : FT2020 / MUE2020
(HALL B)
(Chair:)

1. **A Two Phase Data Transmission Method in Smart Dust Environments**
Joonsuu Park, KeeHyun Park
2. **Entity Summarization in Fuzzy Knowledge Graph Based on Fuzzy Concept Analysis**
Erhe Yang, Fei Hao, Jie Gao, Doo-Soon Park
3. **Research on Optimization of Knapsack Problem in Logistics Distribution**
Yan Zhang, Yanmei Zhou, Hao Hu
4. **Blended Learning as an Effective Approach to English Language Teaching at the**

Institutions of Higher Learning – A Case Study

Blanka Klimova

5. Cultural Discourse in Human-Computer Interactions: Linguistic Aspects of Digital Communication

Marcel Pikhart

10:20-10:30 Coffee Break

10:30-11:50 Session A-2 : BIC2020

(HALL A)

(Chair:)

- 1. Improving Autoencoder using Latent Variables for Novelty Detection**
Seung Yeop Shin and Han-joon Kim
- 2. Real-Time Abnormal Beat Detection Method using Template Cluster for ECG Diagnosis on IoT Devices**
SeungMin Lee, Daejin Park
- 3. Template-Based Local Linear Approximation Using Modified Dynamic Programming for Lightweight ECG Signal Processing on Edge Devices**
SeungMin Lee, Daejin Park
- 4. Investigating Cognitive Load in Multimedia Presentation Using an Eye Tracker**
Ruichen Cong, Kiichi Tago, Qun Jin
- 5. Predicting the Housing Purchase Price Index using Deep Learning Model**
SeungJu Baek, MoonHyun Kim

10:30-11:50 Session B-2 : FT2020 / MUE2020

(HALL B)

(Chair: Byoungwook Kim)

- 1. Interlacing Data to Classify Software in Linear Regression Approach**
Hyun-il Lim
- 2. Blockchain and Trusted Execution Environment Based Fairness Incentive Mechanism in Crowdsensing**
Yihuai Liang, Yan Li, Byeong-Seok Shin
- 3. Hierarchical Similarity Hash for Fast Malware Detection**
Sunoh Cho
- 4. A Study on Dropout Techniques to Reduce Overfitting in Deep Neural Networks**
Hyun-il Lim
- 5. A Benchmark Test for Stateless Stream Partitioning over Distributed Network Environments**
Siwoon Son and Yang-Sae Moon

11:50-13:00 Lunch

13:00-13:30 Invited Speaker
(Chair:)

Current status of ICT Education for National University of Laos

Somphone KANTHAVONG, Ph.D.

Head of Department

Department of Computer Engineering and Information Technology, Faculty of Engineering
National University of Laos, Laos

13:30-13:40 Coffee Break

13:40-15:00 Session A-3 : BIC2020

(HALL A)

(Chair:)

1. **R Parallel Computing to Applicable in Recommendation System**
Phonexay Vilakone, Sony Peng, Hyejung Lee, Doo-Soon Park
2. **A Study of Reference Model and Operation Process for PPP(Public-Private-Partnership) Cloud**
Youngkon Lee, Ukhyun Lee
3. **Model Aggregation Technique for Smart Wafer Fabrication Facility**
Moon Gi Seok and Daejin Park
4. **The Authentication Framework for clinical data in IoT**
Jae Dong Lee, Phil Lip Park, Hyo Soung Cha
5. **Responsive Clinical Research Search Portal (CRSP) in Single Institution**
Jip Min Jung, Phil Lip Park, Jong Soo Hong, Young Sang Jeon, Kui Son Choi

13:40-15:00 Session B-3 : FT2020 / MUE2020

(HALL B)

(Chair: KeeHyun Park)

1. **Design of a Multi-core IP-NDN Gateway for Smart Dust IoT Environments**
JuGeon Pak, Joonsuu Park, KeeHyun Park
2. **Implementation of an Authentication System GTPass**
Monsoon Khadka and Gi-Chul Yang
3. **Analysis Design Study for Fake News Identification and Evaluation**
Lee Won Park, Hangbae Chang
4. **Blockchain-based Secure Digital Twin Framework for Smart Healthy City**
Abir EL Azzaoui, Vincenzo Loia and Jong Hyuk Park
5. **Improvement Efficiency of Fingerprint Database using Mathematical Methods**
Martin Zmítko, Jan Budina, Tomáš Kozel
6. **Academic Paper Personalized Search based on Interest Subject Tracking and Search Performance Evaluation**
Sangjun Han, Sukhyung Lee, Namgyu Kang, Heeseok Choi and Sunpil Choi

15:00-15:10 Coffee Break

15:10-16:30 Session A-4 : HCIS Workshop2020
(HALL A)
(Chair:)

15:10-16:30 Session B-4 : BIC2020 / FT2020 / MUE2020
(HALL B)
(Chair: *Jin Gon Shon*)

1. **An SDN-based Scheduling Method for Industrial IoT Environment with Edge Computing**
Chan Haeng Lee, Jihie Kim, Ji Su Park
2. **Analysis of Communication between Software Part and Hardware Part in APSoc Device**
Shinho Lee, Ara hur and Yeonseung Ryu
3. **Identifying Critical Topics for Successful Games in Game Reviews by Applying Latent Dirichlet Allocation**
Mookyung Kwak, Ji Su Park, Jin Gon Shon
4. **A Study on Protocol Comparison for Energy-efficient Network Configuration in Mobile Edge Computing**
Bok Gi Min, Ji Su Park, Jin Gon Shon
5. **System architecture with respect to indoor localization**
Martin Zmítko, Jan Budina, Tomáš Kozel

16:30-16:40 Coffee Break

16:40-18:00 Session A-5 : HCIS Workshop2020
(HALL A)
(Chair:)

16:40-18:00 Session B-5 : BIC2020 / FT2020 / MUE2020
(HALL B)
(Chair:)

1. **Development of a non-contact autostereoscopic 3D button using artificial intelligence**
Sang-Hee You, Min Hwang, Ki-Hoon Kim, Chang-Suk Cho
2. **Automatic Computing Device Selection Scheme between CPU and GPU for Enhancing the Computation Efficiency**
Geunmo Kim, Sungmin Kim, Jinsung Cho, Jeong-Dong Kim, and Bongjae Kim
3. **Designing a Predictive Model for Efficient Learning Outcomes in Korean Education**
Ji-Hoon Seo, Kil-Hong Joo
4. **Development of Korean Tourist Information Platform based on Big Data**
Ji-Hoon Seo, Kil-Hong Joo

5. **Deep Learning Adoption Blockchain Secure Framework for Cyber Physical System**
Jose Costa Sapalo Sicato , Yi Pan and Jong Hyuk Park

Day 2, Aug. 18, 2020 (Tuesday)

09:00-10:30 Session A-6 : HCIS Workshop2020
(HALL A)
(Chair:)

10:30-10:40 Coffee Break

10:40-12:10 Session A-7 : BIC2020 / FT2020 / MUE2020
(HALL A)
(Chair:)

1. **Experimentation of Human Activity Recognition by Using Accelerometer data based on LSTM**
Phataratah Sa-nguannarm, Ermal Elbasani, Bongjae Kim, Eung-Hee Kim, and Jeong-Dong Kim
2. **Graph and Convolution Recurrent Neural Networks for Protein-compound interaction prediction**
Ermal Elbasani and Jeong-Dong Kim
3. **A provenance-based approach of event tracking for connected vehicle**
Keonhyeong Kim, Im Y. Jung
4. **Current Status and Forecast of Blockchain Application in Security Technology**
Jiwon Han, Yerin Yu, Hanmi Lee, and Jungho Kang
5. **Deep Attention-based Transformer Model for MIDI Music Genre Classification**
Lvyang Qiu , Shuyu Li, Sumi Ji, Yunsick Sung

Day 3, Aug. 19, 2020 (Wednesday)

10:00-12:00 Organizing Committee Meeting

13:00-15:00 Local Arrangement Committee Meeting

16:00-17:00 Executive Meeting – Organized by BIC 2020, FT2020, MUE 2020

Conference Venue



MAISON GLAD JEJU

- MAISON GLAD JEJU Hotel
- 80, Noyeon-ro, Jeju-si, Jeju-do, Korea
- Front desk TEL +82-64-747-5000 / FAX +82-64-742-3150
- Reservation TEL +82-64-747-5000 / FAX +82-64-742-3150

Web: <https://maisongladjeju-hotels.com/en/web/maison-en>

