# The 18th International Conference on Future Information Technology (FutureTech 2023)
# &
# The 17th International Conference on Multimedia and Ubiquitous Engineering (MUE 2023)

April 19-21, 2023
Phum Penh, Combodia

## Organized by

**FutureTech, MUE & KIPS CSWRG**

KIPS
Korea Information Processing Society

KIPS CSWRG
Korea Information Processing Society
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# 2023 International Conferences
## (Sponsored / Technically Sponsored by KIPS / KIPS CSWRG)

**The 6th The International Conference on Big data, IoT, and Cloud Computing (BIC 2023)**
- August 16-18, Jeju, Korea

**The 24th International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT'23)**
- August 16-18, Jeju, Korea

# Message from the FutureTech 2023 General Chairs

FutureTech 2023 is the 18th event of the series of international scientific conference. This conference takes place on April 19-21, 2023 in Phum Penh, Combodia. The aim of the FutureTech 2023 is to provide an international forum for scientific research in the technologies and application of information technology. FutureTech 2022 is the next edition of FutureTech 2022(Jeju, Korea), FutureTech 2021(Jeju, Korea), FutureTech 2020(Jeju, Korea), FutureTech 2019(Xian, China), FutureTech 2018 (Salerno, Italy), FutureTech 2017 (Seoul, Korea), FutureTech 2016 (Beijing, China), FutureTech 2015 (Hanoi, Vietnam), FutureTech 2014 (Zhangjiajie, China), FutureTech 2013 (Gwangju, Korea), FutureTech 2012 (Vancouver, Canada), FutureTech 2011 (Loutraki, Greece), FutureTech 2010 (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: Ji Su Park(Jeonju University, Korea), Yan Li(Inha University, Korea), Ka Lok Man(Xi'an Jiaotong-Liverpool University, China), S. Vimal(National Engineering College, India), 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 2023 General Chairs

Jungho Kang, Baewha Women′s University, Korea
Yi Pan, Georgia State University USA
Vincenzo Loia, University of Salerno, Italy

# Message from the FutureTech 2023 Program Chairs

Welcome to the 18th International Conference on Future Information Technology (FutureTech 2023), which will be held in Phum Penh, Combodia on April 19-21, 2023. FutureTech 2023 will 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 2023, we received many paper submissions, after a rigorous peer review process, we accepted only articles with high quality for the FutureTech 2023 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 2023 Program Chairs

Ji Su Park, Jeonju University, Korea
Yan Li, Inha University, Korea
Ka Lok Man, Xi'an Jiaotong-Liverpool University, China
S. Vimal, National Engineering College, India

# Organization

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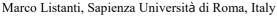Arun Kumar Sangaiah, VIT University, India

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# Message from the MUE 2023 General Chairs

MUE 2023 is the 17th event of the series of international scientific conference. This conference takes place on April 19-21, 2023 in Phum Penh, Combodia. The aim of the MUE 2023 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 2022(Jeju, Korea), MUE 2021(Jeju, Korea), MUE 2020(Jeju, Korea), MUE 2019(Xian, China), MUE 2018 (Salerno, Italy), MUE 2017 (Seoul , Korea), MUE 2016 (Beijing, China), MUE 2015 (Hanoi, Vietnam), MUE 2014 (Zhangjiajie, China), MUE 2013 (Seoul, Korea), MUE 2012 (Madrid, Spain), MUE 2011 (Loutraki, Greece), MUE 2010 (Cebu, Philippines), MUE 2009 (Qingdao, China), MUE 2008 (Busan, Korea), and MUE 2007 (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: Ji Su Park (Jeonju University, Korea), Fei Hao (Xi'an Normal University, China), Alireza Souri(Islamic Azad University, Iran), Sherali Zeadally( University of Kentucky, USA), 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 2023 General Chairs

Jungho Kang, Baewha Women's University, Korea
Yi Pan, Georgia State University USA
Vincenzo Loia, University of Salerno, Italy

# Message from the MUE 2023 Program Chairs

Welcome to the 17th International Conference on Multimedia and Ubiquitous Engineering (MUE 2023), which will be held MUE 2021(Jeju, Korea), on April 19-21, 2023. MUE 2023 will 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 2023, we received many paper submissions, after a rigorous peer review process, we accepted only articles with high quality for the MUE 2023 proceedings. 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!

MUE 2023 Program Chairs

Ji Su Park, Jeonju University, Korea
Fei Hao, Xi'an Normal University, China
Alireza Souri, Islamic Azad University, Iran
Sherali Zeadally, University of Kentucky, USA

# Organization

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# Invited Speaker

## A design of Blockchain-driven Hybrid Network Architecture for Sustainable Smart City

**Pradip Kumar Sharma**

Assistant Professor of Cybersecurity,

Department of Computing Science, University of Aberdeen, Aberdeen, UK

**Abstract**

Recent trends of smart cities have developed notably with the rise and development of the IoT as a novel form of sustainable and continuous development. Smart cities are based on independent and distributed infrastructure including intelligent information processing and control systems, heterogeneous network infrastructure, and ubiquitous sensing involving millions of information sources. And based on the continued growth of data volume and number of connected IoT devices, however, issues such as high latency, bandwidth bottlenecks, security and privacy, and scalability arise in the current smart city network architecture. Designing an efficient, secure, and scalable distributed architecture by bringing computational and storage resources closer to endpoints is needed to address the limitations of today's smart city network. In this talk, we discuss a novel hybrid network architecture for the smart city by leveraging the strength of emerging Software Defined Networking and blockchain technologies in order to achieve efficiency and address the current smart city limitations.

**Biography:**

He is an Assistant Professor in Cybersecurity in the Department of Computing Science at the University of Aberdeen, UK. He received his Ph.D. in CSE from the Seoul National University of Science and Technology, South Korea. He was a Software Engineer at MAQ Software, India, and involved on variety of projects, proficient in building largescale complex data warehouses, OLAP models, and reporting solutions that meet business objectives and align IT with business.

He has published many technical research papers in leading journals from IEEE, Elsevier, Springer, MDPI, etc. Some of his research findings are published in the most cited journals. He has been an expert reviewer for IEEE Transactions, Elsevier, Springer, and MDPI journals and magazines. He received a top 1% reviewer in computer science by Publons Peer Review Awards 2018 and 2019, Clarivate Analytics. He has also been invited to serve as chair and program committee member in several reputed international conferences such as ACM ICDNC 20201, IEEE CCNC 2021, CSA 2020, HCIS 2020, IEEE ICC2019, IEEE MENACOMM'19, 3ICT 2019, etc.

# PROGRAM Schedule for
# FutureTech 2023 & MUE 2023

| Day 1, April. 19, 2023 | | |
|---|---|---|
| **Time** | **Min** | **HALL A** |
| 09:30-11:30 | 120 | **Organizing Committee Meeting I**<br>**(Only for Invited Members)** |
| 11:30-12:30 | 60 | **Lunch** |
| 12:30-13:00 | 30 | **Registration** |
| 13:00-14:30 | 90 | **On&Offline Session A-1**<br>**FutureTech 2023 & MUE 2023**<br>**Chairs: J. Wang** |
| 14:30-14:50 | 20 | **Coffee Break** |
| 14:50-16:20 | 90 | **On&Offline Session A-2**<br>**FutureTech 2023 & MUE 2023**<br>**Chair: Joon-Min Gil** |
| 16:20-16:40 | 20 | **Coffee Break** |
| 16:40-18:00 | 80 | **Keynote Speech**<br>**A design of Blockchain-driven Hybrid Network Architecture for Sustainable Smart City**<br>**Prof. Pradip Kumar Sharma**<br>**Chair: Byung Seok Shin** |
| 18:00-18:30 | 30 | **Break** |
| 18:30-20:00 | 90 | **Banquet** |

| Day 2, April. 20, 2023 | | |
|---|---|---|
| **Time** | **Min** | **HALL A** |
| 09:30-10:00 | 30 | **Registration (Open only until 12:00)** |

| | | |
|---|---|---|
| 10:00-12:00 | 120 | **On&Offline Session A-3**<br>**Korea-China R&D Workshop**<br>**Chair: Ji Su Park** |
| 12:00-13:00 | 60 | **Lunch** |
| 13:00-15:00 | 120 | **Local Arrangement Committee Meeting**<br>**(Only for Invited Members)** |

| Day 3, April. 22, 2023 | | |
|---|---|---|
| **Time** | **Min** | **HALL -A** |
| 10:00-12:00 | 120 | **Executive Meeting - Organized by FutureTech 2023, MUE 2023**<br>**(Only for Invited Members)** |
| 12:00-13:00 | 60 | **Lunch** |
| 13:00-15:00 | 120 | **Organizing Committee Meeting II**<br>**(Only for Invited Members)** |

1. **A paper presentation should be made by one of authors of the paper for A paper presentation should be made by one of authors of the paper for 20 minutes (15 minutes for the presentation itself and 3 minutes for Q/A).**
2. **All speakers of each session should meet the session chair at their room 20 minutes before the session begins.**
3. **Windows 10 laptops running the Adobe Reader and Microsoft Office for paper presentations will be prepared. Please prepare for your presentation.**
4. **All online sections are played recorded video only.**
5. **For Q&A in the online section, please email the author.**

# DETAILED SCHEDULE FOR
# The 18th International Conference on Future Information Technology (FutureTech 2023)
# &
# The 17th International Conference on Multimedia and Ubiquitous Engineering (MUE 2023)

## Day 1, April 19, 2023 (Wednesday)

**09:30-11:30    Organizing Committee Meeting I**

**11:30-12:30    Lunch**

**12:30-13:00    Registration**

**13:00-14:30    On&Offline Session A-1 FutureTech 2023 & MUE 2023**
**(Chair: J. Wang)**

1. **Early Prediction of Players' Computational Thinking Ability in Educational Computer Game**
   *Yeongwook Yang, Ji Su Park*
2. **Deep learning-based Representative Spatio-Temporal Documents Classifcation**
   *Byoungwook Kim, Yeongwook Yang*
3. **Container Deployment Scheme using Multiple Scheduling Technique for Efficiency and Sustainability in Cloud Computing**
   *Sihyun Park, Jueun Jeon, Young-Sik Jeong*
4. **AI-based Vertical Container Autoscaler for Effective Containerized Application**
   *Byeonghui Jeong, Jueun Jeon, Young-Sik Jeong*
5. **Parallel Collaborative Filtering using Deep Belief Network with Location-Based Social Networks**
   *Sony Peng, Yixuan Yang, Sophort Siet, Ilkhomjon Sadriddinov, Dae-Young Kim, Doo-Soon Park*
6. **Community Evolution Analysis of Dynamic Social Network based on SLPA**
   *Yixuan Yang, Sony Peng, Sophort Siet, Sadriddinov Ilkhomjon, Seok-Hoon Kim, Doo-Soon Park,*
7. **A Anomaly Detection Method Based on DNN**
   *Y. Lin, J. Wang*

**14:30-14:50    Coffee Break**


**14:50-16:20    On&Offline Session A-2 FutureTech 2023 & MUE 2023**
**(Chair: Joon-Min Gil)**

1. **A Smart Power Wheelchair Control Based on Embedded System for Exo-skeleton Robot Following**
   *Zongjing Cao, Yan Li, Byeong-Seok Shin*
2. **Windows Memory Forensic System for Cyber Incident Analysis**
   *K. Shanmugam, P. Berbakov*
3. **End to End Performance Maximization through Data Transfer Node**
   *Truong Thuy Trang, Ngoc Phi NGUYEN*
4. **Calculation Methods for Data Analysis in Social Systems**
   *Muhammad Fazal, Muhammad Syafrudi*
5. **Chinese Word Segmentation Model based on Deep Neural Networks**
   *Jin Liu, Lin Liu, Yun Lia*
6. **A Study on Research Paper Classification based on BERT Model**
   *Dipto Biswas, Joon-Min Gil*
7. **A Study on KoBERT-based Category Classification Model for News Articles**
   *Dipto Biswas, Joon-Min Gil*


**16:20-16:40    Coffee Break**


**16:40-18:00    Keynote Speech**
**(Chair: Byung Seok Shin)**

**A design of Blockchain-driven Hybrid Network Architecture**
**for Sustainable Smart City**
**Prof. Pradip Kumar Sharma**


**18:00-18:30    Break**


**18:30-20:00    Banquet**


# Day 2, April 20, 2023 (Thursday)


**09:30-10:00    Registration**


**10:00-12:00    On&Offline Session A-3 Korea-China R&D Workshop**
**(Chair: Ji Su Park)**

1. **AI-based Abnormal Behavior Detection for Container Cluster**
   *Jueun Jeon, Seungyeon Baek, Young-Sik Jeong*
2. **Requirements Analysis and Design of Digital Twin-based Test Bed**
   *Jaewoo Yoon, Youngsun Park, Ji Su Park*
3. **Multi-source Heterogeneous Big Data Management**
   *Wenchao Meng, Shizhong Li, Xiaojie Qiu, Jun Chen*
4. **Trusted Coverage and Reliable Transmission**
   *Shenghao Liu, Shunli Zhang, Ruonan Zhao, Laurence T. Yang*
5. **A privacy preserving homomorphic encryption scheme for federated learning based IIoT environment**
   *Mikail Mohammed Salim, Oscar Enrique Llerena Castro, Jong Hyuk Park*
6. **Post Quantum lattice based secure framework using one-time ring linkable signature for blockchain-based IoT Applications**
   *Abir EL Azzaoui, Sekione Reward Jeremiah, Jong Hyuk Park*
7. **Lightweight Federated Learning Architecture for Network Anomaly Detection in Large Scale Heterogeneous IoMT Networks**
   *Heeji Park, Jungho Kang*
8. **A secure blockchain-based zero-trust architecture for seamless authentication in 6G IoV networks**
   *Jimin Ha, Jungho Kang*

**12:00-13:00    Lunch**

**13:00-15:00    Local Arrangement Committee Meeting**

# Day 3, April 21, 2023 (Friday)

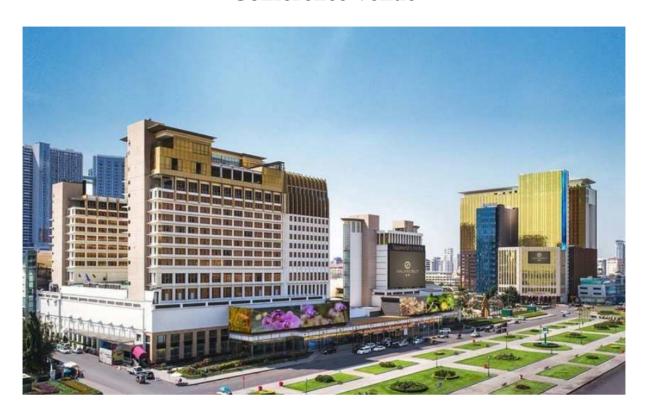**10:00-12:00    Executive Meeting – Organized by FutureTech 2023, MUE 2023**

**12:00-13:00    Lunch**

**13:00-15:00    Organizing Committee Meeting II**

# Conference Venue



**NagaWorld Integrated Resort, Phnom Penh, Kingdom of Cambodia.**

**Site**: https://www.nagaworld.com/meet/venues/

**Phone:** +855-2322-8822
**Email:** enquiries@nagaworld.com
**Address:** Samdech Techo Hun Sen Park, Phnom Penh, 120101, P.O. Box 1099 Phnom Penh,
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Ⅱ. By Ferry



Ⅲ. By Airport Transfers



Ⅳ. By Taxi

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Take Taxi from Phnom Penh International Airport to the hotel about 35 minutes