FC 2023

FC 2023

Frontier Computing Conference Group

IET The Institution of Engineering and Technology

The 13th International Conference on Frontier Computing

Theory, Technologies and Applications

July 10 – 14, 2023
Tokyo, Japan & Online Event

The 13th International Conference on Frontier Computing (FC 2023)

Co-Located Event
The International Workshop on Advanced Information Technology (ADINTECH 2023)
2023 International Conference on Machine Learning on FinTech, Security and Privacy (MLFSP 2023)

FC 2023
Final Program

Tokyo, Japan & Online Event

July 10-14, 2023

Organized by

Frontier Computing Conference Group

Sponsors

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NATIONAL TAICHUNG UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Message from Organizing Committees

The inception of the International Conference on Frontier Computing – Theory, Technologies, and Applications (FC) can be traced back to an IET executive meeting in early 2010. This esteemed conference series serves as a platform for facilitating an expansive exchange of ideas, aiming to attain a comprehensive understanding of the latest advancements and emerging trends in the fields of information technology, science, and engineering. The thematic focus encompasses areas such as Communication Technology and Applications, Computer Science, Business Intelligence and Knowledge Management, Artificial Intelligence, as well as other pertinent domains that actively foster the progression of information technology.

Marking its 13th iteration, this forthcoming event epitomizes the culmination of an enduring tradition. Noteworthy contributions and notable findings from previous conferences, namely FC 2010 (Taichung, Taiwan), FC 2012 (Xining, China), FC 2013 (Gwangju, Korea), FC 2015 (Bangkok, Thailand), FC 2016 (Tokyo, Japan), FC 2017 (Osaka, Japan), FC 2018 (Kuala Lumpur, Malaysia), FC ABH 2019 (Taichung, Taiwan), FC 2019 (Kitakyushu, Japan), FC 2020 (Singapore, Online), FC 2021 (Online), and FC 2022 (Tokyo, Japan), are prominently preserved within the digital library and conference proceedings.

By bringing together researchers from various corners of the globe, this scholarly gathering strives to cultivate a stimulating and intellectually enriching environment. It fosters dynamic discussions, propelling the frontiers of knowledge and nurturing future collaborative endeavors. This year, FC2023 marks the 13th anniversary of the esteemed FC conference series. Despite the persistent challenges posed by the pandemic over the course of three years, our conference has the unique opportunity to host a hybrid event, encompassing both an onsite presence in Tokyo and online participation. Notably, each presentation will be thoughtfully planned as a video stream accessible through the conference website.

The conference proceedings will include a collection of papers that have been accepted, focusing primarily on the current frontiers of computing. In conjunction with the main event, FC2023 will also feature a series of workshops and special sessions, offering a comprehensive overview of the latest advancements in the field of frontier computing. We extend our heartfelt gratitude to the authors for their invaluable contributions, as well as to all other participants who have played a pivotal role in making this conference a resounding success. Their support has been instrumental in bringing this event to fruition.

Furthermore, we express our sincere appreciation to the multitude of experts whose expertise and dedication have contributed to the triumph of this conference. As we look towards the future, we fervently hope that our next FC event, FC2024, can be held in a fully onsite format. Anticipation runs high, as we envisage it to be yet another remarkable milestone in the illustrious FC conference series.

FC Organizing Committees
FC Conference Group
July 2023

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Schedule

Day 1 - July 10, 2023 (Monday)

	Room 3	Room 4	Virtual Room
13 : 30 ~ 13 : 45	Opening Ceremony		
14 : 00 ~ 15 : 20	Session 1 – 1	Session 1 – 3	Session 1 - 5
15 : 30 ~ 16 : 50	Session 1 – 2	Session 1 – 4 ADINTECH 2023	
17 : 00 ~	Enjoy the beauty of Tokyo		

Day 2 - July 11, 2023 (Tuesday)

	Room 2	Room 3	Room 4
9 : 30 ~ 10 : 50	Session 2 - 1	Session 2 – 4 MLFSP	Session 2 - 7 Fi-Award 2023
10 : 50 ~ 11 : 00	-- Coffee break --		
11 : 00 ~ 12 : 20	Session 2 – 2	Session 2 – 5 MLFSP	Session 2 – 8 Report Talk
12 : 20 ~ 14 : 00	Lunch		
14 : 00 ~ 15 : 20	Session 2 – 3	Session 2 – 6	Session 2 – 9 Report Talk
15 : 20 ~ 15 : 30	-- Coffee break --		
16 : 00 ~ 17 : 00	Keynote Speaker: Dr. Mirjana Ivanovic Chair: Dr. Yen Pei		
18 : 30~	Banquet		

- 7 -

	Room 3	Room 4
Day 3 - July 12, 2023 (Wednesday)		
9 : 30 ~ 11 : 00	**Session 3 – 1**	**Session 3 – 2** **MLFSP**

Day 4 - July 13, 2023 (Thursday)
Executive Committee Meeting

Day 5 - July 14, 2023 (Friday)
Executive Committee Meeting

Keynote Speaker

Dr. Mirjana Ivanovic

Professor at Faculty of Sciences, University of Novi Sad, Serbia

Title of talk

How Artificial Intelligence Changed Medical Decisions – Past, Present, Future

Mirjana Ivanovic holds the position of Full Professor at Faculty of Sciences, University of Novi Sad, Serbia. She is a member of National Scientific Committee for Electronics, Telecommunication and Informatics within Ministry of Science, Technological Development, and Innovations, Republic of Serbia and member of Board of directors of the Institute for Artificial Intelligence Research and Development of Republic of Serbia. She was a member of University Council for Informatics for more than 12 years. Prof. Ivanovic is the author or co-author of 14 textbooks, several international monographs and more than 450 research papers, most of which are published in international journals and conferences. Her research interests include agent technologies, intelligent techniques, applications of data mining and machine learning techniques in medical domains and technology enhanced learning. She is a member of Program Committees of more than 350 international conferences, Program/General Chair of several international conferences, and leader of numerous international research projects. Mirjana Ivanovic delivered numerous keynote speeches at international conferences and visited many academic institutions all over the world as visiting researcher (Germany, Slovenia, Portugal, Australia, China, Korea). Currently she is Editor-in-Chief of the Computer Science and Information Systems journal and Associate Editor of several international Journals. She also was Guest Editor of numerous special issues in respectable international journals.

Abstract of Talk

Artificial intelligence (AI) is emergent paradigm nowadays with enormous potential to increase quality of any software system and service. Different ICT approaches were employed in health information systems starting from traditional ones towards nowadays modern intelligent techniques and approaches. Development and improvement of intelligent techniques are constantly influencing implementation of higher quality intelligent and personalized health and medical systems. On the other hand in modern dynamic society more and more, even young people suffer from chronical and serious diseases. Accordingly, different health and medical stakeholders have recognized importance of development of appropriate services to help patients suffering from different kinds of diseases but also to help old/disabled people in making their life easier and if possible to increase their health quality of life issues. Patient's complex big data (like clinical, environmental, nutritional, everyday activities…) is needed and it is necessary to properly aggregate such data, analyze it and present to the doctors/caregivers to recommend adequate treatment and interventions to patients. The intention of this presentation is to give a brief overview of use of different ICT and AI techniques in traditional and modern health and medical information systems. The gathering, processing, and using huge amounts of data in precision medicine influenced by powerful techniques and approaches liek Data Mining, Machine Learning, Federated Learning, Metaverse, Agents will be considered. Some typical systems will be presented inspired by authors' long-lasting experiences in using such methods in numerous applications. Additionally, we will summarize how modern AI approaches will influence development of future personalized and intelligent medical services.

Keywords：Artificial intelligence, Machine learning, Big medical data, Personalized medicine.

-Day 1-
July 10, 2023

Opening Ceremony

Session 1 - 1
Chair: Dr. Jai-Wei Chang, National Taichung University of Science and Technology, Taiwan

1. **LNMER-Net: A Metabolically Enhanced Lymph Node Metastasis Recognition Model Based on Lung Lymph Nodes and Microenvironment**
   Lingyun Wang, Huiyan Jiang, Yang Zhou, Qiu Luan, Bulin Du, Yaming Li, Xuena Li and Yan Pei

2. **Key Factors for Unsubscribing from YouTube Channels: A Study of YouTubers in Taiwan**
   Hsuan-Che Yang and Wen-Chih Chang

3. **Practical Research on AI Visual Focus Analysis in Online Teaching**
   Ming-Feng Lee, Guey-Shya Chen, Ming-Zhi Cheng, Hui-Chien Chen and Jian-Zhi Chen

4. **Design of a Fair Distributed Computing Platform based on Distributed Ledger Technology and Performance Measurements**
   Bo-Yan Liao, Jai-Wei Chang and Hao-Shang Ma

Session 1 - 2
Chair: Dr. Hao-Shang Ma, National Taichung University of Science and Technology, Taiwan

1. **A Study on the Design of Eye and Eyeball Method based on MTCNN**
   Cheng-Yu Hsueh, Jason C. Hung, Jian-Wei Tzeng, Hui-Chun Huang and Chun-Hong Huang

2. **Case classification system based on Taiwanese civil summary court cases**
   Ming-Yi Chen, Jia-Wei Chang, Hsiao-Chin Lo and Ying-Hung Pu

3. **A study on the integration of worked examples and blended learning in the curriculum during the COVID-19 epidemic**
   Hung Sun and Shu-Wei Chang

4. **Innovative Interaction Mode in VR Games**
   Yi-Chun Liao

Session 1 - 3
Chair: Dr. Hwa-Young Jeong, Kyung Hee University, Korea

1. **Cryptanalysis and Improvement to Two Key-Policy Attribute-Based Encryption Schemes for Weighted Threshold Gates**
   Yi-Fan Tseng and Pin-Hao Chen

2. **New group-key-based Over the Air (OTA) Update Model Facilitating security and efficiency Using MQTT 5**
   Hung-Yu Chien, Nian-Zu Wang, Yuh-Min Tseng and Ruo-Wei Hung

3. **Exploring the Potential of Webcam-Based Eye-Tracking for Traditional Eye-Tracking Analysis**
   Cheng-Hui Chang, Jason C. Hung and Jia-Wei Chang

4. **Using Convolutional Neural Network to Assist Teachers Detecting Test Sheet Cognition Level**
   Wen-Chih Chang and Charoenwat Moocharoen

Session 1 - 4
The International Workshop on Advanced Information Technology (ADINTECH 2023)
Chair: Dr. Insik Choi, Hannam University, Korea

1. **The new paradigm of Safe and Sustainable Transportation: Urban Air Mobility**
   Muhammad Yeasir Arafat and Sungbum Pan

2. **Fusion Self-Attention Feature Clustering Mechanism Network for Person ReID**
   Mingshou An, Hye-Youn Lim, Yunchuan He and Dae-Seong Kang

3. **A study on how to generate fire data from video/image using the F-guess and ROI method**
   Jong-Sik Kim, Hye-Youn Lim and Dae-Seong Kang

Session 1 - 5

Chair: Ms. Yenjou, Wang. Waseda University, Japan

1. **Proximity Capacitive Gesture Recognition for Recursive Neighbor Memory Neural Network**
   Chao-Ting Chu and Jia-Wei Chang

2. **Joint Multi-view Feature Network for Automatic Diagnosis of Pneumonia with CT Images**
   Hao Cui, Fujiao Ju and Jianqiang Li

3. **Ensemble Deep Learning Techniques for Advancing Breast Cancer Detection and Diagnosis**
   Adam M.Ibrahim, Jianqiang Li and Yan Pei

4. **A Survey of Speech Recognition for People with Cerebral Palsy**
   Yu-Ru Wu, Jason C Hung and Jia-Wei Chang

5. **Fuzzy Proximity Two-Dimension Inductance Gesture Recognition System Analysis and Implement**
   Chao-Ting Chu and Jia-Wei Chang

6. **Positive-Unlabeled Learning with Field of ViewConsistency for Histology Image Segmentation**
   Xiaoqi Jia, Chong Fu, Jiaxin Hou and Wenjian Qin

7. **Big data and Network Analysis in National Innovation Systems: The Roles of Academia, Industry, and Government Research Institutes and their Interactions**
   Eun Sun Kim, Yunjeong Choi and Jeongeun Byun

8. **Fire and Smoke Detection using YOLO through Kafka**
   Kai-Yu Lien, Jung-Chun Liu, Yu-Wei Chan and Chao-Tung Yang

-Day 2-
July 11, 2023

Session 2 - 1
Chair: Dr. Chun-Hong Huang, Lunghwa University of-Science and Technology, Taiwan

1. **A Practical Application using Big Data and ioT**
   Hwa-Young Jeong, Jinho Ahn and Hackyoon Kim

2. **A Study on the Improvement of Navigation Accuracy with ArUco Markers**
   Seung-Been Lee, Dong-Hyun Jo, Min-Ho Kim, Hee-Bum Kim and Byeong-Gwon Kang

3. **Pavement Distress Detection Using YOLO and Faster RCNN on Edge Devices**
   Chen-Kang Chiu, Jung-Chun Liu, Yu-Wei Chan and Chao-Tung Yang

4. **A Fairness-aware Load Balancing Strategy in Multi-Tenant Clouds**
   Yu-Teng Chen and Kuan-Chou Lai

Session 2 - 2
Chair: Dr. Yu-Wei Chan, Providence University, Taiwan

1. **Cluster-Based Blockchain Systems for Multi-Access Edge Computing**
   Chih Peng Lin and Hui Yu Fan

2. **An Intelligent Thermal Compensation System Using Edge Computing for Machine Tools**
   Lu-Yan Wang, Chao-Tung Yang, Jung-Chun Liu, Cheng-Kai Huang and Shih-Jie Wei

3. **Implementation of A Deep Learning-based Application for Work-related Musculoskeletal Disorders' Classification in Occupational Medicine**
   Yu-Wei Chan, Yi-Cyuan Tseng, Yu-An Chen, Yu-Tse Tsan, Chen-Yen Liu, Shang-Zhe Lu, Li-Fan Xu and Chao-Tung Yang

4. **Case Study in Developing Extensible Virtual Assistant Using Genie Framework**
   Yi-Ting Wu, Albert Chang, Yu Hung Tsai, Po-Chuan Wang, Tinghao Chen and Jeng-Wei Lin

5. **The application of artificial intelligence to support behavior recognition by zebrafish: A study based on deep learning models**
   Yi-Ling Fan, Fang-Rong Hsu, Jing-Yaun Lu, Min-Jie Chung and Tzu-Ching Chang

Session 2 - 3
Chair: Dr. Jia-Wei Chang, National Taichung University of Science and Technology, Taiwan

1. **A Comparative Study of GPT-2 and GPT-2 Based on Enhanced Self-Attention Mechanism**
   Wei-Hung Tu, Neil Yen and Yan Pei

2. **Single-to-Multi Music Track Composition Using Interactive Chaotic Evolution**
   Ying Kai Hung, Yan Pei and Jianqiang Li

3. **SIAR: An Effective Model for Predicting Game Propagation**
   Tianyi Wang, Guodong Ye, Xin Liu, Rui Zhou, Jinke Li and Tianzhi Wang

4. **Symbolic Regression Using Genetic Programming with Chaotic Method-based Probability Mappings**
   Pu Cao, Yan Pei and Jianqiang Li

Session 2 - 4
International Conference on Machine Learning on FinTech, Security and Privacy (MLFSP 2023)
Chair: Dr. Wei-Chen Wu, National Taipei University of Business, Taiwan

1. **The Development of Bluetooth Speakers with Independent Control for the Intervals Training of Aural Skills**
   Yu Ting Huang, Chi Nung Chu

2. **Spatial correlation analysis of accidents and casualties related to drunk driving**
   Yu-Yu Yen, Cheng-Hu Chow, Shiou-Wei Fan, Liang-Ann Chen

3. **A comparative study on the impact of urban hazards and the reconstruction of old buildings on the property prices of surrounding residential areas**
   Shiou-Wei Fan,Wei-Chen Wu,Cheng-Hu Chow,Yu-Yu Yen

4. **The use of AI technology and embryo imaging for the diagnosis of artificial reproduction techniques**
   Jui-hung kao, Yu-Yu Yen, Horng-Twu Liaw

Session 2 - 5
International Conference on Machine Learning on FinTech, Security and Privacy (MLFSP 2023)
Chair: Dr. Wei-Chen Wu, National Taipei University of Business, Taiwan

1. **Concept Drift Adaption for Online Game Chargeback Detection**
   Yu-Chih Wei, Ching-huang Lin, Yan-Ling Ou, Wei-Chen Wu

2. **Build a DeFi Trading Ecosystem Based on the Oracle of RNN**
   Wei-Chen Wu, Yu-Chih Wei

3. **Online Learning Motivation and Dilemma of Secondary Vocational Students**
   Jun Wu, Hsiao-Fen Liu

4. **Reflecting on Integrating Team-Based Learning into Project-Based Practical Courses to Enhance Social-Emotional Learning**
   Ching-Yao Lin, Chih-Che Lin

5. **Technology-Assisted Self-Regulated Learning: Practice in a Senior High School Classroom**
   Hsiao-Ping Chang, Hsiao-Fen Liu

6. **Exploring the Potential of Short Videos in Flipped**
   Jen-Chia Chang, Cheng-Chung Lee

Session 2 - 6
Chair: Dr. Lin Hui, Tamkang University, Taiwan

1. **A Novel Few-Shot Learning with Meta-Gradient Memory**
   Lin Hui, Yi-Cheng Chen and Pin-Chen Tseng

2. **ADDIE Instructional Design Model combined with AI Technology in the Design of an Auxiliary Correction System for IPOTA**
   Yung-Hui Chen, Chun-Hsiung Tseng, Lin Hui, Tony C. T. Kuo, Jian-Yu Chen and Jeffrey Kurniawan Chandra

3. **Enhanced Multipath QUIC Protocol with Lower Path Delay and Packet Loss Rate**
   Chih-Lin Hu, Fang-Yi Lin, Wu-Min Sung, Nien-Tzu Hsieh, Yung-Hui Chen and Lin Hui

4. **An Efficient Edge-Based Index for Processing Collective Spatial Keyword Query on Road Networks**
   Ye-In Chang, Jun-Hong Shen and Sheng-Yang Lin

Session 2 - 7
Frontier Innovation Award Competition 2023 (Fi-Award 2023)

1. **The Intelligent Fish Weight Grading System Based on Instance Segmentation Algorithm**
   Advisor: Yi-Zeng Hsieh
   Members: Chia-Hsuan Wu, Cheng-Hou Chou, Hsin-Yu Huang, Chi-Kuang Lin

2. **AI Editor-in-Chief and Virtual News Presenter: An Artificial Intelligence-Based Pipeline for Automated News Production**
   Advisor: Jai-Wei Chang
   Members: Chun-Ju Tao, Zhen-Yu Chen, Po-Hsin Chang, Cheng-Syun Yang

3. **Dungeon Survival Game**
   Advisors: Lin Hui, Yung-Hui Chen
   Members: Huai-Ming Chang, Yu-Chen Chang, Chia Chun Chang

Session 2 - 8 Report Talk

1. **Exploring Game-Based Learning Based on Social Cognitive Theory in EFL class**
   Yu-Ting Fu, Pei-Hsuan Lin, Mu-Yen Chen and Chia-Chen Chen

2. **Report Talk**
   - Presenter 1: Yu-Siang Luo
   - Presenter 2: Pin-Ting Ho
   - Presenter 3: Jung Shen
   - Presenter 4: Ting-Yi Lee
   - Presenter 5: Yu-Hao Ting

Session 2 - 9 Report Talk

- ♦ **Report Talk**
  - Presenter 1: Fang-Chiao Yang
  - Presenter 2: Yung-Ju Chen
  - Presenter 3: Yu-Jung Lee
  - Presenter 4: Zhi-Xun Cai
  - Presenter 5: Jo-Yu Hsieh
  - Presenter 6: Hsin-Yu Chang

-Day 3-
July 12, 2023

Session 3 - 1
Chair: Yan Pei, University of Aizu, Japan

1. **mKIPS: A Lightweight Modular Kernel-Level Intrusion Detection and Prevention System**
   Yuan-Zheng Yi and Mei-Ling Chiang

2. **Applying Virtual Reality to Teaching the Law of Conservation of Energy in Physics**
   Tung-Hua Yang, Yi-Ru Yang and Ching-Chi Huang

3. **Multi-Feature Data Generation for Design Technology Co-Optimization: A Study on WAT and CP**
   Shih-Nung Chen and Shi-Hao Chen

4. **Comments on a Double-Blockchain Assisted Data Aggregation Scheme for Fog-Enabled Smart Grid**
   Pei-Yu Lin, Ya-Fen Chang, Pei-Shih Chang and Wei-Liang Tai

6. **Scanning QR codes for object detection based on Yolo-v7 algorithm and deblurring generative adversarial network**
   Huan Chen, Hsin-Yao Hsu, Kuan-Ting Lin, Jia-You Hsieh, Yi-Feng Chang and Bo-Chao Cheng

Session 3 - 2
International Conference on Machine Learning on FinTech, Security and Privacy (MLFSP 2023)

Chair: Dr. Wei-Chen Wu, National Taipei University of Business, Taiwan

1. **Development of A Wearable Sleep Airway Optical Monitor**
   Yen-Tsung Lin, Woei-Chyn Chu, Kuang-Chao Chen

2. **The Development of An Endoscope-Assisted iMET to Improve the Distal Screw Hole Positioning Efficacy in Interlocking Nailing Procedures**
   Chih-Wei Shih, Tung-Lin Chiang,Woei-Chyn Chu

3. **Improving Interoperability in Healthcare: A User-Friendly International Standard Data Conversion Framework**
   Hsiu-An Lee, Tzu-Ting Huang, Lo-Hsien Yen, Pin-Hua Wu, Chen-Yi Liu, Chien-Yeh Hsu

4. **Development of an Artificial Intelligence-based Precise Nutrition and Dietary Management Model with Nutrient Intake Recommendation Framework**
   Chen-Yi Liu, Pin-Hua Wu, Hsiu-An Lee, Tzu-Ting Huang, Lo-Hsien Yen, and ChienYeh Hsu

5. **Identify Vulnerable Components in IoT Using Machine Learning**
   Chia-Mei Chen, Sheng-Hao Lin, Gu-Hsin Lai, Ya-Hui Ou, Zheng-Xun Cai

-Day 4-
July 13, 2023

Organizing Committee Meeting

-Day 5-
July 14, 2023

Organizing Committee Meeting

Information For Paper Presenters

FC 2023 will be held in Tokyo, Japan.

During the conference's about **80-minute** parallel sessions, papers will be presented. Each paper will have a maximum of **15 minutes** for presentation and 5-minute for Q&A.

For on-site participants, please refer to the next page, "Conference Venue," for more information about the venue and transportation options.

The Opening Ceremony and Keynote Speaker sessions will be conducted in a hybrid mode. Authors participating in the online meeting can join the Zoom meeting using the following link:

Join Zoom Meeting
Title: The 13th International Conference on Frontier Computing (FC 2023)
Link:
https://us06web.zoom.us/j/89432553961?pwd=WDBGNVZsTW5GdDJFWXYydGdzOFZMZz09
Meeting ID: 894 3255 3961
Time: 13:20 ~ (UTC/GMT+8)
Date: July 10, 2023

The time indicated is "UTC/GMT+8." You can check your local time using an online time conversion tool, such as www.timeanddate.com.

Conference Venue

The 13th International Conference on Frontier Computing (FC 2023) will be held at the **Ariake Central Tower Hall & Conference**, Tokyo, Japan.

Ariake Central Tower Hall & Conference

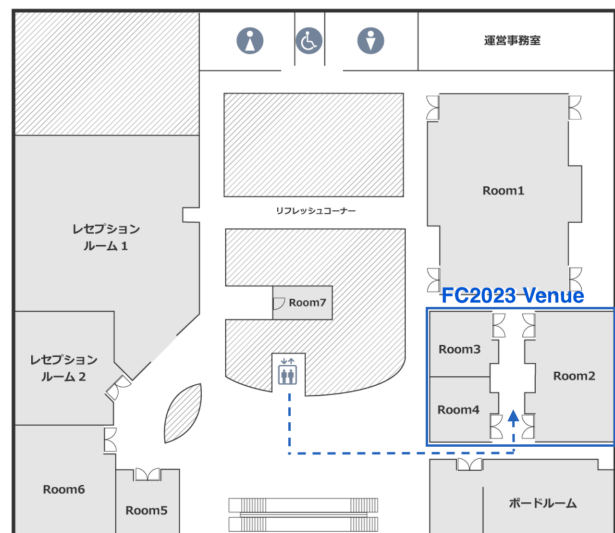**Address**

Ariakesentorarutawa 3F, 3-7-18, Ariake, Koto, Tokyo

Hikarie Website

https://ariake-hall.jp/access.html

Access

- Participants can use the following two metro lines to access the FC 2023 venue.
  - Yurikamome Line: Get off at "Tokyo Big Sight" Station, about 4 minutes on foot
  - Rinkai Line: Get off at "Kokusai Tenjijo" Station, about 5 minutes on foot

After you arrive at Ariake Central Tower Hall, you can take any elevator to the conference venue on the 3rd floor (Room 2, 3, 4).

Banquet

The FC2023 banquet will be held at T. Y. HABOR. Please refer to the following details for venue-related information:

Address

2-1-3 Higashi-Shinagawa, Shinagawa-ku, Tokyo

Access

♦   Tokyo Monorail Line - Tennoz Isle Station Central Exit - 5min Walk

♦   Rinkai Line - Tennoz Isle Station B Exit - 5min Walk

♦   JR Line - Shinagawa Station South Exit - 20min Walk

Access from Venue to Banquet

The banquet venue is **two stations away** from FC2023 Venue. Please take the **Rinkai Line** from "**Kokusai Tenjijo**" station and get off at "**Tennoz Isle**" Station (B Exit), then walk for 5 minutes.