

**FC 2022**  
Frontier Computing Conference Group

**IET** The Institution of  
Engineering and Technology



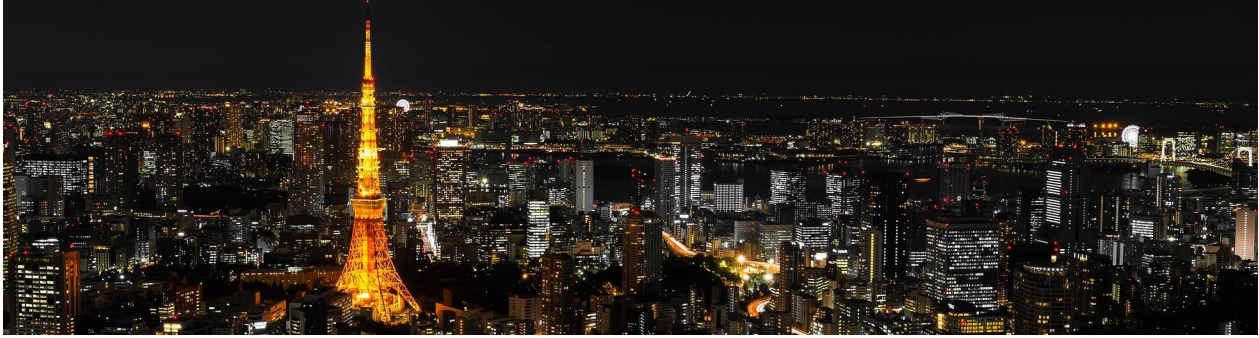
**FC 2022**  
**The 12th International Conference  
on Frontier Computing**  
Theory, Technologies and Applications

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**FINAL PROGRAM**

**JULY 12 – 15, 2022**  
**TOKYO, JAPAN & ONLINE EVENT**





# **The 12th International Conference on Frontier Computing (FC 2022)**

## **Co-located event**

**The International Workshop on Advanced Information Technology  
(ADINTECH 2022)**

**The 6th International Conference on Big-data, IoT, Cloud computing  
Technologies and Applications (BICTA 2022)**

# **FC 2022 Final Program**

**Tokyo, Japan & Online Event  
July 12-15, 2022**

**Organized by**

**Frontier Computing Conference Group**

## Sponsors



IET Taipei Local Network

國際工程與科技學會中華民國分會



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OF SCIENCE AND TECHNOLOGY

## Message from Organizing Committees

The International Conference on Frontier Computing – Theory, Technologies, and Applications (FC) was first proposed in early 2010 in an IET executive meeting. This conference series aims at providing an open forum to reach a comprehensive understanding of the recent advances and emergence in information technology, science, and engineering, with the themes in the scope of Communication Technology and Applications, Business Intelligence and Knowledge Management, Artificial Intelligence, and any related fields that prompt the development of information technology. This will be the 12th event of the series, in which fruitful results can be found in the digital library or conference proceedings of FC 2010 (Taichung, Taiwan), FC 2012 (Xining, China), FC 2013 (Gwangju, Korea), FC2015 (Bangkok, Thailand), FC2016 (Tokyo, Japan), and FC2017 (Osaka, Japan), FC2018 (Kuala Lumpur, Malaysia), FC ABH2019 (Taichung, Taiwan), FC2019 (Kitakyushu Japan), FC2020(Singapore, Online), FC2021(Online). Each event brings together the researchers worldwide to have exciting and fruitful discussions as well as future collaborations.

This year FC2022 is the 12th-anniversary event of the FC conference series, after three years' pandemic continues, our conference can have an opportunity to be onsite in Tokyo and Online to form a hybrid conference and each presentation is planned as a video stream on the website. The papers accepted for inclusion in the conference proceeding primarily cover the topics of current frontier computing areas. The FC2022 is organized together with server workshops and special sessions. These events present the current developments of frontier computing. We send our sincere appreciation to the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Appreciates are also due to the many experts who contributed to making the event a success. We hope we can have the next FC event, FC2023, in fully onsite form, and it will be the next great event of the FC conference series

**FC 2022 Organizing Committees**  
**FC Conference Group**  
**July 2022**

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## Schedule

<b>Day 1</b> <b>July 12, 2022 (Tuesday)</b>	
	<b>Room O</b>
<b>13 : 00 ~ 14 : 30</b>	<b>Session 1-1</b>
<b>14 : 40 ~ 15 : 40</b>	<b>Session 1-2</b>
<b>15 : 40 ~ 16 : 00</b>	<b>Opening Ceremony by Dr. Jason C. Hung</b>
<b>16 : 00 ~ 17 : 00</b>	<b>Keynote Speech by Dr. Kim F. Rockell</b>

<b>Day 2</b> <b>July 13, 2022 (Wednesday)</b>		
	<b>Room D</b>	<b>Virtual</b>
<b>9:00 ~ 10:00</b>	<b>Session 1-3</b>	<b>Session 2-1</b>
<b>10:00 ~ 11:00</b>	<b>Session 1-4</b>	<b>Session 2-2</b>
<b>11:00 ~ 12:00</b>	<b>Session 1-5</b>	<b>Session 2-3</b>
<b>12:00 ~ 13:00</b>	<b>Lunch break</b>	
<b>13:00 ~ 15:00</b>	<b>Session 1-6</b>	<b>---</b>
<b>15:00 ~ 17:00</b>	<b>Report Talk</b> Emerging topics in Frontier Computing	

<b>Day 3</b> <b>July 14, 2022 (Thursday)</b>	
	<b>Virtual</b>
<b>11:00 ~ 12:00</b>	<b>Session 2-4</b>
<b>12:00 ~ 13:00</b>	<b>Lunch break</b>
<b>13:00 ~ 14:00</b>	<b>Session 2-5</b>
<b>14:00 ~ 15:00</b>	<b>Session 2-6</b>

<b>Day 4</b> <b>July 15, 2022 (Friday)</b>	
<b>11:00 ~ 12:00</b>	<b>Executive Committee Meeting</b>
<b>12:00 ~ 14:00</b>	<b>Lunch break</b>
<b>13:00 ~ 14:00</b>	<b>Organizing Committee Meeting</b>



## Keynote Speaker



**Dr. Kim F. Rockell**

**Associate Professor  
Faculty of Arts and Sciences  
Komazawa University  
Tokyo, Japan**

### **‘Noh-ing’ English through Ethnomusicology**

#### **Abstract**

What does the discipline of ethnomusicology involve? This presentation broadly introduces its history, fundamental issues, procedures, and more recent problems in the post-human context. It narrates more specifically the personal challenge of learning Japanese Noh as non-Japanese and combining traditional Japanese performing arts and English language education while working with computer science students in Aizu-Wakamatsu, Fukushima. These experiences formed the basis for current research on Linking Japan to the World through Performing Arts through collective ethnography and semiotic clusters [JP20K01193], the gradual progress of which during the recent COVID-19 pandemic is also discussed during the presentation.

*Keywords: Ethnomusicology, Japan, Noh, language education, performing arts*

#### **Biography**

Kim Rockell is an associate professor in the Faculty of Arts and Sciences at Komazawa University, Tokyo, and also teaches in the Music Liberal Arts program at Tokyo College of Music. He is an ethnomusicologist whose research interests encompass plucked-string traditions, Philippine rondalla, Hispanic musical influences in the Asia Pacific, migrant music and music in diaspora, and the music/language nexus. While learning to perform traditional Japan Noh theatre, he began to explore the educational potential of English language Noh to empower the voices of undergraduate computer science students in Aizu-Wakamatsu, Japan.

# Day 1

## July 12, 2022

### Session 1-1

Chair: Dr. Yen Pei, University of Aizu, Japan

- 1. Using Maximum Deviation Method and Linguistic Intersection Method to Evaluate Parking Lot Investment Target**  
Wen-Ping Huang
- 2. The Research about Influence Factors of Purchase Intention for Electric Motorcycle and Financial Management Implications**  
Jung-Kai Tsai
- 3. Research on Relationship among Transactional leadership, Work Pressure, Organizational Justice, Job Embeddedness, Work and Family Conflict, Work Load and Intention to leave of Workers in Insurance Industry**  
Chung-Min Hung
- 4. The Correlation among Corporate Value , Illegal Behavior s and Corporate Overconfidence Case study of a real estate firm in Shenzhen**  
Yen Hung Chen
- 5. An Ant Colony Optimization Prediction Approach to Forecast Aesthetic Medicine Product Demand after COVID-19 for Sustainable Development**  
Ming-Chuan Lee

### Session 1-2

#### Workshop on Smart Computing for Emerging Technologies and Applications

Chair: Dr. Hung-Yi Lin, National Taichung University of Science and Technology, Taiwan

- 1. Mobile Robot Controller Design Using Deep Learning**  
Jyun-Yu Jhang and Cheng-Jian Lin
- 2. Using Deep Learning Method to Solve Arrhythmia Detection**  
Jyun-Yu Jhang and Cheng-Jian Lin
- 3. The Gait Planning Design for Biped Robot**  
Shun-Hung Tsai, Kuan-Yo Chen, Yu Liang, Dong-Yuan Lyu, Hung-Yi Lin and Luh-Maan Chang
- 4. Fault Diagnosis of Spindle Vibration Using Deep Learning**  
Ku-Yuan Lee, Bae-Ling Chen and Jyun-Yu Jhang

# Day 2

## July 13, 2022

### Session 1-3 Soft Computing

Chair: Mr. Yanan Wang, University of Aizu, Japan

1. **GAN-generated data for BCI: current state of affairs and challenges**  
Eduardo Carabez
2. **Conditional Melody Generator From Given Lyrics Using Interactive Chaotic Evolutionary**  
Yingkai Hung
3. **A case study of cluster analysis of the whole slide images**  
Zhixin Dong and Haifeng Mei

### Session 1-4 Optimization

Chair: Dr. Carabez Andrade Eduardo, National Institute of Technology, Akita College, Japan

1. **Combinatorial optimization using chaotic optimization**  
Yi Ding
2. **Niching method for multi-modal optimization problems using chaotic evolution algorithm**  
Xiang Meng
3. **An Analysis of Students Needs for Online Learning Classes using Text Mining**  
Hwa-Young Jeong

## **Session 1-5 Machine Learning**

Chair: Ms. Yenjou Wang, Waseda University, Japan

- 1. Optimization of Multi-Objective Evolution algorithm**  
Zitong Wang
- 2. Applying IRT to Estimate Learning Ability and Girvan–Newman algorithm Clustering in Programming Learning**  
Wen-Chih Chang and Hsuan-Che Yang
- 3. Integrating Content Analysis with Cooperative Learning in the Programming Courses: A Case Study**  
Wen-Chih Chang and An-Ray Chang

## **Session 1-6 Machine Learning**

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

- 1. Preference Analysis of Human Auditory Perception in Sound Composition Optimization Using Interactive Differential Evolution**  
Yanan Wang
- 2. Communication-Efficient Federated Learning with Model Pruning**  
Min-Kuan Chang, Yu-Wei Chan and Ting-En Wu
- 3. Report Talk**  
  
Presenter 1: YU-SHENG CHIANG  
Presenter 2: YI-WEI CHEN  
Presenter 3: YU-SHENG CHIANG  
Presenter 4: XUAN-FANG LIN

## **Session 1-7 Frontier Computing**

Chair: Mr. Zitong Wang, University of Aizu, Japan

- **Emerging topics in Frontier Computing**

Presenter 1: QI-YAN ZHENG

Presenter 2: PEI-JUNG CHEN

Presenter 3: MING-YI PAN

Presenter 4: CHIEH-HAN HSU

Presenter 5: BO-HAN HUA

## **Session 2-1**

### **Workshop on Machine Learning on FinTech, Security and Privacy**

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

1. **Quantum Computing on the On-chain and Off-chain Security of DeFi Oracles**  
Wei-Chen Wu, Yu-Chih Wei
2. **A comparison of domestic and international IoT Information Security Testing Standards based on text mining methods**  
Yu-Chih Wei, Yu-Chun Chang, Wei-Chen Wu
3. **A Study on Spatial Correlation Econometrics Analysis of the Establishment for Bank Branches**  
Yu-Yu Yen, Jui-Hung Kao, Cheng-Hu Chow
4. **A Study on the Application of Geospatial Analysis to the Assessment of Infant Nursery Service Resources and Potential Needers**  
Horng-Twu Liaw, Fang-Hsing Liu, Kuan-Wen Lio

## **Session 2-2 Feature Engineering**

Chair: Dr. Neil Yen, University of Aizu, Japan

- 1. A Fundus Image Myopia Diagnosis Model Based on Homogeneous Multimodal Feature Fusion**  
Pengceng Wen, Yu Guan, Jianqiang Li, Tariq Mahmood and Yinzheng Zhao
- 2. A Teaching Framework Based on Big Data of Students' Learning Behaviors: a Case Study of Academic Performance Prediction**  
Dian Li, Shujie Ding, Weidong Wang, Haoru Su and Yichen Wang
- 3. Analysis of the Frailty and High-risk Posture of the Elderly Based on Edge Computing and Artificial Intelligence**  
Yu-Yu Yen, Yu-Han Chiu, I-Wei Chiang, Horng-Twu Liaw

## **Session 2-3 Real World Applications**

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

- 1. Efficient Approximate Calculations and Application of Network Centrality**  
Dongning Rao, Yulu Ye, Zhuoyi Lin and Wenzhi Ding
- 2. Path Based Subgraph Searching in Distributed Environments**  
Kyoungsoo Bok, Minyoung Kim, Hyeonbyeong Lee, Dojin Choi, Jongtae Lim and Jaesoo Yoo
- 3. An improved method for Chinese relationship extraction**  
Zhuo Su, Bo Liu, Jianqiang Li and Yan Pei
- 4. Self-Reconfiguring Pseudo Random Address Generator for Secure Infrared Communication**  
Sangook Moon and Jae Cheol Lee

## Day 3

### July 14, 2022

#### Session 3-1 Big Data

1. **Electronic music classification model based on multi feature fusion and machine learning algorithm**  
Xiaoxia Yuan
2. **Research on sentence group division and its judgment rules in natural language processing**  
Qunfang Bai
3. **Optimization design and Simulation of construction cost model**  
Jinbao Cao
4. **The application of information technology in classified training and layered teaching of marketing specialty in Higher Vocational Colleges under the integration of industry and education**  
Mingfa Chen

#### Session 3-2 IoT

1. **Application of mobile learning app in College English ESP Hybrid Teaching in Application-oriented Universities**  
Ruoqing Chen
2. **System design of agricultural economic management mode in China under data mining technology**  
Xianjun Chen
3. **Big data analysis and prediction of college employment based on machine learning**  
Yong Chen
4. **System design of agricultural economic management mode in China under data mining technology**  
Zhaoman Chen

## **Session 3-3 AI Applications**

- 1. Educational application of artificial intelligence technology in the construction of cross-border e-commerce platform**  
Zhongming Chen
- 2. Application of ant colony algorithm in tourist traffic route**  
Xin Cheng
- 3. The integration of business and finance based on the background of bulk trade risk management and control in cloud computing environment**  
Xiujuan Zhang, Yong Wei
- 4. Evaluation model and algorithm of physical education teaching in Colleges and Universities**  
LeiFan



**Day 4**  
**July 15, 2022**

**AM: Executive Committee Meeting**

**PM: Organizing Committee Meeting**

## Conference Venue

The 12th International Conference on Frontier Computing (FC 2022) will be held at the **Hikarie - Hikarie Conference, Shibuya City, Tokyo, Japan,**



### Address

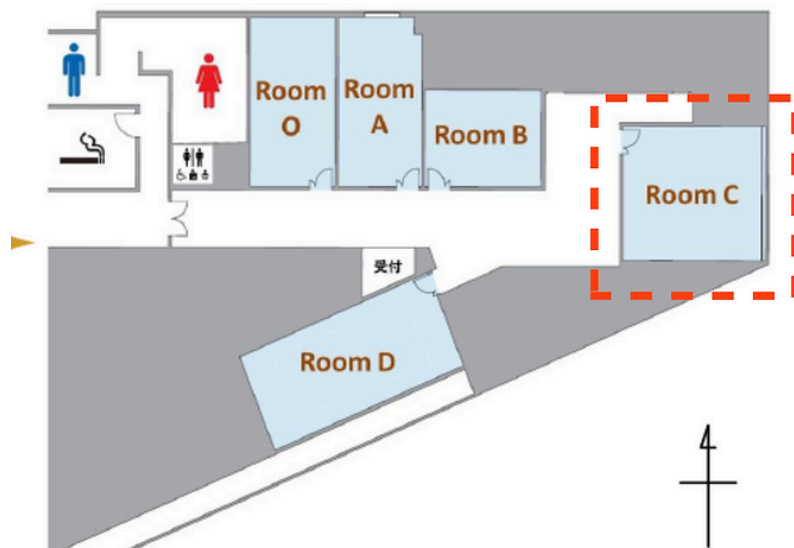
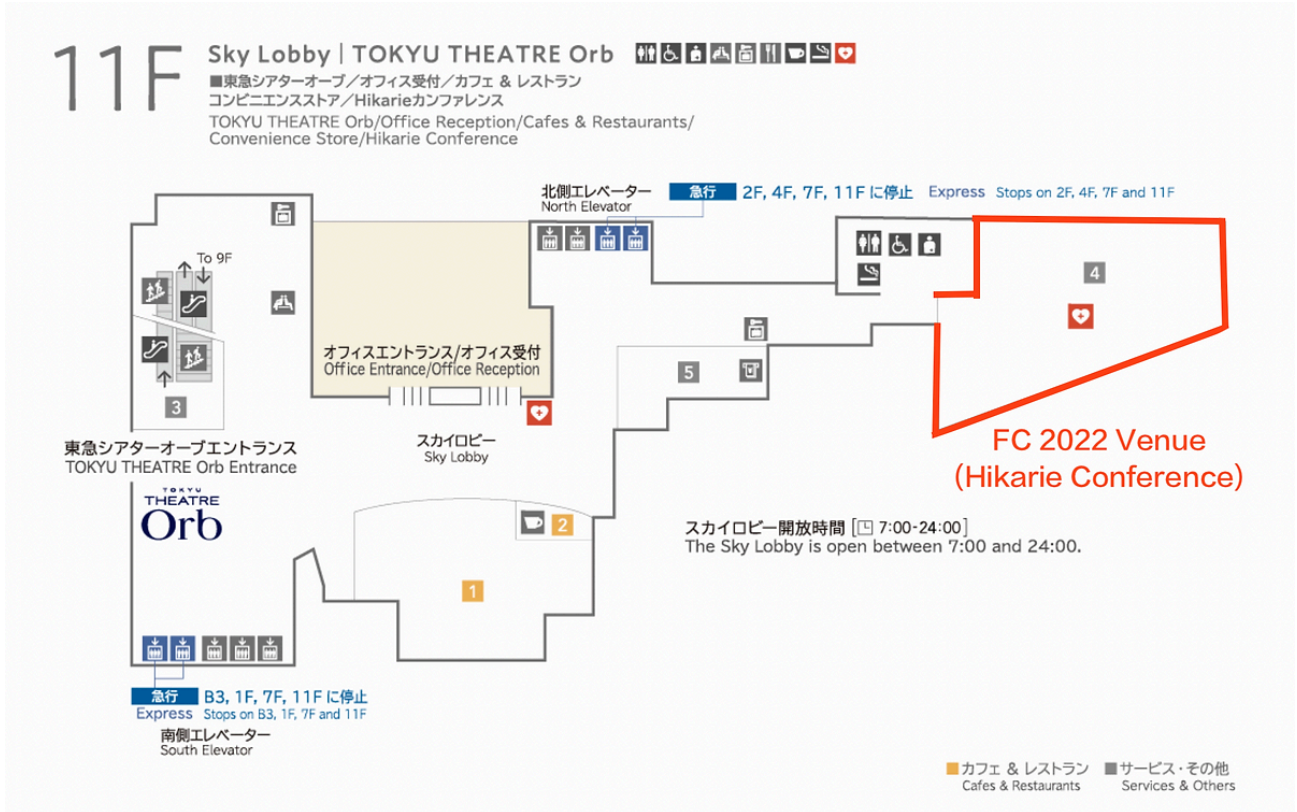
11F, 2-21-1, Shibuya, Shibuya-ku, Tokyo, 150-8510

### Access

- Hikarie is connected directly in JR Line, Keio Inokashira Line "Shibuya Station" and the second-floor connecting walkway
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- Tokyu Toyoko Line, Denentoshi Line, Tokyo Metro Hanzomon Line, Fukutoshin Line "Shibuya Station" Exit B5 and direct connection

After you arrive at hikarie, you can take any elevator in hikarie to the conference venue on the 11th floor (Hikarie Conference).

# Floor Maps



**For More Information: Hikarie Website**

<https://www.hikarie.jp.e.ui.hp.transer.com/access/>

