

Proceedings of

NCSP 2023

RISP International Workshop on Nonlinear Circuits,
Communications and Signal Processing 2023

February 28 - March 3, 2023, Honolulu, Hawaii
(Hybrid Conference)

Issuing date: February 28, 2023 JST

Research Institute of Signal Processing, Japan

Contents

Greeting Message from General Co-Chairs	iii
General Information	v
Session Schedule	viii
For Virtual Presentations	viii
For Onsite Presentations	ix
Technical Program	1
28PM1-1: Wireless Communication Systems 1	1
28PM1-2: Artificial Intelligence and Machine Learning 1	1
28PM2-1: Nonlinear Circuits and Systems 1	2
28PM2-2: Artificial Intelligence and Machine Learning 2	3
28PM2-3: Signal Processing	3
28PM3-1: Wireless Communication Systems 2	4
28PM3-2: Artificial Intelligence and Machine Learning 3	5
1AM1-1: Nonlinear Circuits and Systems 2	5
1AM1-2: Artificial Intelligence and Machine Learning 4	6
1AM2-1: Nonlinear Circuits and Systems 3	6
1AM2-2: Sound and Speech Processing	7
1AM2-3: Wireless Communication Systems 3	8
1PM1-1: SS2. Neural Prosthesis and WiBIC 1	8
1PM1-2: Artificial Intelligence and Machine Learning 5	9
1PM1-3: Communication & Sensor Networks	9
1PM2-1: SS2. Neural Prosthesis and WiBIC 2	10
1PM2-2: Image & Video Signal Processing	10
1PM2-3: SS1. Recent Progress of VLC for 6G	11
2AM1-1: Nonlinear Applications	12
2AM1-2: Artificial Intelligence and Machine Learning for Time Series	12
2AM2-1: Wireless Communication Systems 4	13
2AM2-2: Applications of Signal Processing	13
3AM1-1: Bifurcation and Chaos	14
3AM1-2: Artificial Intelligence and Machine Learning for Image Processing	14
3PM1-1: IoT Applications	15
3PM1-2: Biomedical Signal Processing	15
Author Index	17
A	17
B	17
C	17
D	17
E	17
F	17
G	17
H	17

I	17
J	18
K	18
L	18
M	18
N	19
O	19
P	19
Q	19
S	19
T	20
U	20
W	20
X	20
Y	20
Z	21

Greeting Message from General Co-Chairs



Hiroo Sekiya
Chiba University, Japan
General Co-Chair, NCSP2023



Tetsuya Shimamura
Saitama University, Japan
General Co-Chair, NCSP2023

Dear Friends and Colleagues,

On behalf of the Organizing Committee, it is our great honor to welcome you to the 2023 International Workshop on Nonlinear Circuits, Communications and Signal Processing (NCSP'23), to be held at the Alamoana Hotel, Honolulu, Hawaii, from February 28 to March 3, 2023. This conference is organized by the Research Institute of Signal Processing (RISP), Japan.

NCSP was established to provide a forum for the exchange of the latest results related to nonlinear circuits, communications, and signal processing, from fundamentals to applications in various fields of science and engineering, reflecting the multidisciplinary nature of the topics and activities. The hard work of the Technical Program Committee allowed preparing a very high-quality scientific program for the delegates, reflecting the wide range of topics and the growing research interests in the field. As a result, we accept 130 excellent papers to be in the technical program of NCSP'23.

We would like to take this opportunity to thank all the members of the organizing committee, technical program committee co-chairs, all the authors who decided to submit their papers to NCSP2023, and so many reviewers who made the selection of the best papers and the student paper awards. We believe that we have achieved our goal of providing a conducive environment for participants to discuss significant developments that will contribute to the evolution of their research areas.

Due to the COVID-19 pandemic, NCSP'20 canceled the face-to-face meeting, and NCSP'21 and 22 were held as online conferences. This is the first in-person NCSP since the pandemic. We believe that face-to-face discussions and interactions stimulate participants and lead to the generation of new ideas. We also prepared the online sessions. Information technology eliminates the problem of physical distance. Hosting the NCSP in a hybrid format is challenging, but we hope it will add value to the NCSP.

We sincerely hope that NCSP'23 will provide you not only with the wonderful experience of a technology conference but also a place to meet old friends, make new ones, and enjoy the Hawaiian culture.

Welcome to NCSP'23!
Welcome to Hawaii!

Sincerely yours,
General Co-Chairs

A handwritten signature in cursive script that reads "Hiroo Sekiya".

Hiroo Sekiya (Chiba University, Japan)

A handwritten signature in cursive script that reads "Tetsuya Shimamura".

Tetsuya Shimamura (Saitama University, Japan)

2023 RISP International Workshop on Nonlinear Circuits, Communications and Signal Processing (NCSP'23)

Organizer:

Research Institute of Signal Processing, Japan (RISP)
<http://www.risp.jp/>

In Cooperation with:

Acoustic Society of Japan (ASJ)

Organizing Committee:

General Co-Chairs	Hiroo Sekiya (Chiba University) Tetsuya Shimamura (Saitama University)
Technical Program Co-Chairs	Shintaro Arai (Okayama University of Science) Xiuqin Wei (Chiba Institute of Technology) Yutaka Shimada (Saitama University)
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General Information

Location of Conference Venue

Ala Moana Hotel,
410 Atkinson Drive Honolulu, Hawaii 96814, USA.
TEL: 808-955-4811

Presentation Instructions

(a) For All Speakers and Audiences

- We will conduct all sessions at NCSP'23 using Zoom. All speakers and audiences should install the Zoom application on their computers or tablets in advance.
- We will have up to three rooms using Zoom breakout sessions. After connecting to Zoom, please enter the breakout session room in which you present or listen.
- All speakers and audiences should display their name, affiliation, and role in the session (speaker, chair, audience) in Zoom as follows.

Display example

[Chair] Hiroo Sekiya (Chiba Univ.)

[Presenter] Kosuke Sanada (Mie Univ.)

- Please do not record videos or take screenshots of presentations.
- We will inform you of the Zoom ID and passcode for NCSP'23 by email when the workshop date approaches.

(b) For All Speakers

- All Speakers have 18 minutes for their presentation (15 minutes for presentation + 3 minutes for Q&A).
- All speakers must screen share their slides via Zoom on their computers or tablets during the presentation.
- All speakers should connect to Zoom 10 minutes before the session starts.
- To ensure that your presentation goes smoothly, please check your screen share, camera, and microphone under the direction of your session chair in the session room.

(c) For Onsite Speakers

- Onsite speakers do not have to connect their computer or tablet to a projector in the session room because all speakers screen share their slides via Zoom during the presentation.
- We will provide Free Wi-Fi access in all session rooms.
- We will connect a Zoom-linked PC to a projector and show speakers' slides onto the screen in the room.
- We recommend that speakers use the pointer option in their presentation application.
- We do not allow onsite speakers to present virtually from hotels or other locations. Note that we allow some speakers in the special sessions to present virtually from other countries.
- Because Hawaii's climate is hot, NCSP'23 attendees need not wear formal clothes, such as a tie and a suit, in sessions and social events. We recommend that attendees wear an Aloha shirt, which is formal wear in Hawaii, according to Hawaii's culture.

(d) **For Virtual Speakers**

- Virtual speakers should turn on their cameras during their presentations in Zoom. Especially, an award-eligible person (student) must turn on their cameras because we need to check whether they are presenting. If an award-eligible person does not turn on their camera, we may remove them from the award review process.

(e) **For All Audiences**

- Virtual audiences can listen to the onsite presentations and ask questions virtually from other countries. However, due to the dependence on the wireless environment of the onsite venue, we conduct the onsite Zoom streaming on a best-effort style. We kindly ask for your understanding.

- To ensure that virtual audiences can hear as much as possible, we will provide a microphone for onsite audiences to ask questions.

Student Paper Award

NCSP'23 review committee members will evaluate a camera-ready paper and an oral presentation of an award-eligible person. Then, we will determine award winners based on the overall evaluation scores.

Requirements for Eligible Person of NCSP'23 Student Paper Award:

1. You must be a student and the first author of the paper.
2. Your camera-ready paper must have four pages in length.
3. You must submit your camera-ready paper by its deadline.
4. You must check "Entry for Student Paper Award Contest" in the submission system when submitting your paper.
5. You must give an oral presentation (onsite or virtual) at the conference. (Note that if you present your study on a recorded video, you might be disqualified from the award-eligible person.)
6. You must not be a past NCSP student paper award winner.
7. Whether your presentation is in a "Regular Session" or a "Special Session," you are eligible for the award if you fulfill the above 1-6.

Social Events

Registration from February 28 to March 3

- February 28, 15:00-17:00, PLUMERIA
- March 1, 8:30-12:40, 14:00-17:40, PLUMERIA
- March 2, 8:45-12:40, PLUMERIA
- March 3, 8:30-12:40, PLUMERIA

NCSP'23 name cards will be handed out at registration. Please keep them during the NCSP'23 conference.

Banquet on March 2

The banquet will be held on a boat. We will take a bus to the pier together. Meet at 4:15 p.m. at the tour desk of the Ala Moana Hotel on the 1st floor. The committee staff will meet you at the hotel lobby. Please bring your NCSP'23 name card and your ID (PASSPORT)!

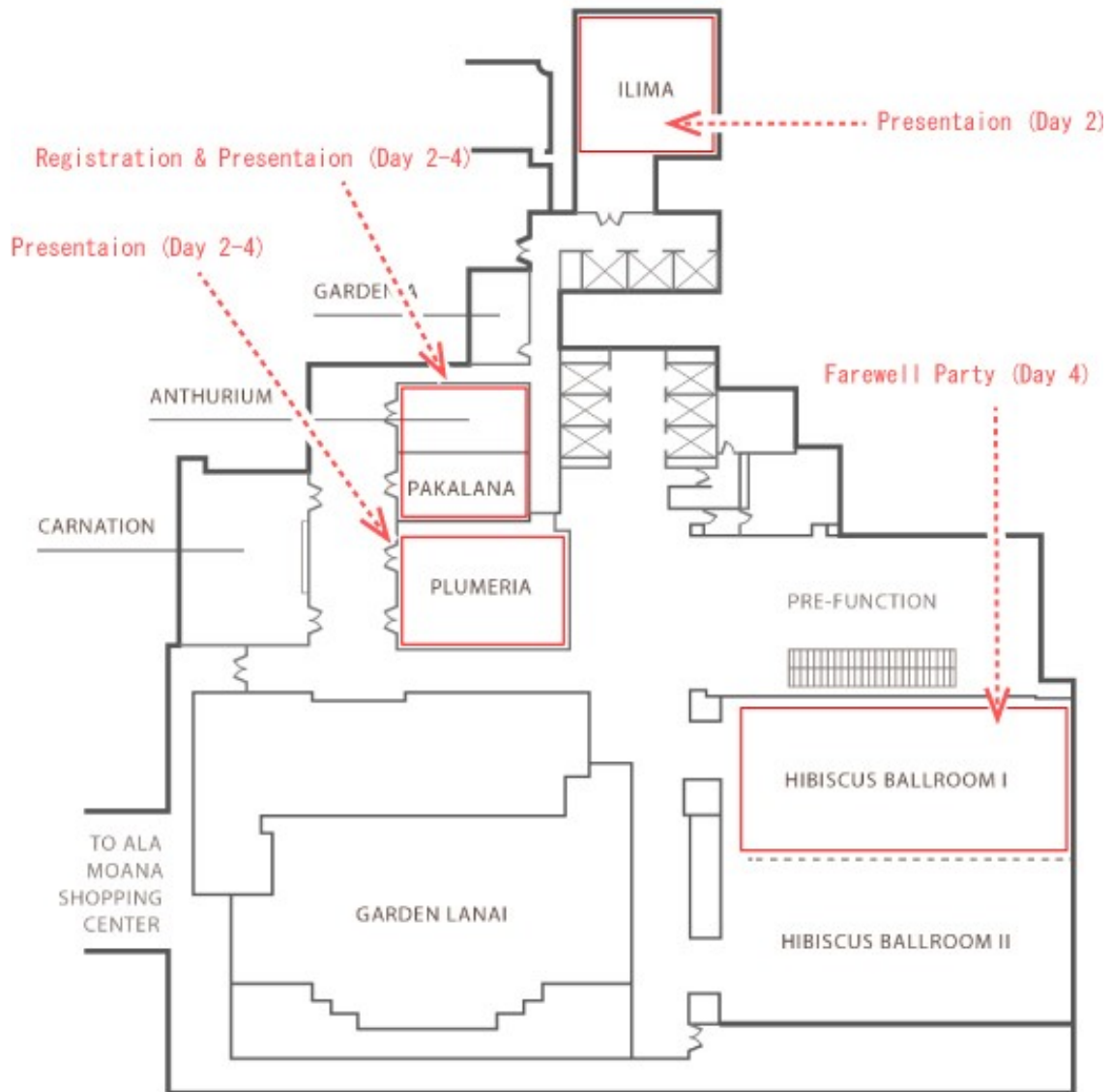
Farewell Party on March 3

The farewell party of NCSP'23 will be held from 5:00 p.m., March 3 (HST), at HIBISCUS BALLROOM 1, 2nd floor, Ala Moana Hotel. Please join the party on time. We will also hold the Student Paper Award Ceremony during the farewell party. All students are welcome to attend.

Conference Proceedings Distribution

All the conference-paper authors will receive the download information of the conference proceedings on Tuesday, February 28, 2023 (JST).

Floor Plan



Please do not hesitate to contact us if you have any questions. Contact address: Kosuke Sanada, General Secretary of NCSP'23. Email: secretariat23@ncsp.jp

Session Schedule

For Virtual Presentations

	Zoom Meeting Room 1	Zoom Meeting Room 2	Zoom Meeting Room 3
28 Feb., 14:00 - 15:40 HST (1 Mar., 09:00 - 10:40 JST)	28PM1-1: Wireless Communication Systems 1 Page 1	28PM1-2: Artificial Intelligence and Machine Learning 1 Page 1	
28 Feb., 16:00 - 18:00 HST (1 Mar., 11:00 - 13:00 JST)	28PM2-1: Nonlinear Circuits and Systems 1 Page 2	28PM2-2: Artificial Intelligence and Machine Learning 2 Page 3	28PM2-3: Signal Processing Page 3
28 Feb., 19:00 - 21:00 HST (1 Mar., 14:00-16:00 JST)	28PM3-1: Wireless Communication Systems 2 Page 4	28PM3-2: Artificial Intelligence and Machine Learning 3 Page 5	

- Times in Hawaii time (HST), GMT -10 hours
- (Times): Times in Japan time (JST), GMT +9 hours

For Onsite Presentations

	PLUMERIA	PAKALANA & ANTHURIUM	ILIMA
1 March, 09:00 - 10:40	1AM1-1: Nonlinear Circuits and Systems 2 Page 5	1AM1-2: Artificial Intelligence and Machine Learning 4 Page 6	
1 March, 11:00 - 13:00	1AM2-1: Nonlinear Circuits and Systems 3 Page 6	1AM2-2: Sound and Speech Processing Page 7	1AM2-3: Wireless Communication Systems 3 Page 8
March 1, 14:00-15:40	1PM1-1: SS2. Neural Prosthesis and WiBIC 1 Page 8	1PM1-2: Artificial Intelligence and Machine Learning 5 Page 9	1PM1-3: Communication & Sensor Networks Page 9
1 March, 16:00 - 17:40	1PM2-1: SS2. Neural Prosthesis and WiBIC 2 Page 10	1PM2-2: Image & Video Signal Processing Page 10	1PM2-3: SS1. Recent Progress of VLC for 6G Page 11
2 March, 09:20 - 10:40	2AM1-1: Nonlinear Applications Page 12	2AM1-2: Artificial Intelligence and Machine Learning for Time Series Page 12	
2 March, 11:00-12:40	2AM2-1: Wireless Communication Systems 4 Page 13	2AM2-2: Applications of Signal Processing Page 13	
3 March, 11:00 - 13:00	3AM1-1: Bifurcation and Chaos Page 14	3AM1-2: Artificial Intelligence and Machine Learning for Image Processing Page 14	

- Times in Hawaii time (HST), GMT -10 hours

Technical Program

28PM1-1: Wireless Communication Systems 1

Date: 28 February, 2:00pm to 3:40pm HST (1 March, 9:00am to 10:40am JST)

Room: Zoom Meeting Room1

Chair: Wenqi Zhu (Chiba University)

- | | | |
|---|--|----|
| 28PM1-1-1 | Identification for Sink Devices Using CNN Based on the Received and Supplied Power Waveform During the USB-PD Negotiation Process | 1 |
| Takumi Wada (Kanagawa Institute of Technology), Haruhisa Ichikawa (The University of Electro-Communication), Yoshito Tobe (Aoyama Gakuin University), Shinji Yokogawa (The University of Electro-Communication), Yuusuke Kawakita (Kanagawa Institute of Technology) | | |
| 28PM1-1-2 | A Study on Tracking and Notification of Human Motion using LiDAR Sensors | 5 |
| Yuki Matsuo (Konan University), Masahiro Wada (Konan University) | | |
| 28PM1-1-3 | Performance Evaluation of Ethereum Blockchain on Flying Ad-hoc Network | 9 |
| Yue Su (Chiba University), Kien Nguyen (Chiba University), Hiroo Sekiya (Chiba University) | | |
| 28PM1-1-4 | Experimental Demonstration of APCMA's Scalability Advantage over Current LPWA | 13 |
| Kohei Shiotsuka (Tokyo University of Science), Kentaro Honda (Tokyo University of Science), Kenji Leibnitz (National Institute of Information and Communications Technology), Ferdinand Peper (National Institute of Information and Communications Technology), Naoki Wakamiya (Osaka University), Yoshihiro Maeda (Tokyo University of Science), Mikio Hasegawa (Tokyo University of Science) | | |
| 28PM1-1-5 | A Routing Method Considering Content-Server Mobility in Tree-Structured Mobile Network over CCN | 17 |
| Yuto Nakagawa (Tokyo University of Information Sciences), Masaki Hanada (Tokyo University of Information Sciences), Hidehiro Kanemitsu (Tokyo University of Technology) | | |

28PM1-2: Artificial Intelligence and Machine Learning 1

Date: 28 February, 2:00pm to 3:40pm HST (1 March, 9:00am to 10:40am JST)

Room: Zoom Meeting Room2

Chair: Takafumi Tanaka (Tamagawa University)

- | | | |
|---|---|----|
| 28PM1-2-1 | Influences of Dataset Divided by the Size in Sweet Potato Selection System Using Deep Learning | 21 |
| Nguyen Thao Nguyen (Shikoku University), Yasuteru Hosokawa (Shikoku University) | | |

28PM1-2-2	Shape Sorting by Deep Learning in Sweet Potato Selection System	25
<p>Bao Duong Gia Nguyen (Shikoku University), Yasuteru Hosokawa (Shikoku University)</p>		
28PM1-2-3	Knowledge Distillation with Mask-based Relationship for Speech Enhancement	29
<p>Jiachen Wang (Waseda University), Li Li (Nippon Telegraph and Telephone Corporation), Shoji Makino (Waseda University)</p>		
28PM1-2-4	Deep Complex-Valued Neural Network-Based Triple-Path Mask and Steering Vector Estimation for Multi-channel Target Speech Separation	33
<p>Mohan Qin (Waseda University), Li Li (Nippon Telegraph and Telephone Corporation), Shoji Makino (Waseda University)</p>		
28PM1-2-5	Development of CNN to Estimate Depth Distribution Spectrometry of Soil	37
<p>Mohd Azam Bin Mohd Pauzi (Kagawa University), Takuto Umemoto (Kagawa University), Kenichi Fujimoto (Kagawa University), Minoru Sakama (Tokushima University), Kazumasa Inoue (Tokyo Metropolitan University), Masahiro Fukushi (Tsukuba International University), Yusuke Imajyo (Advanced Fusion Technology Co. Ltd.), Michitaka Endo (Advanced Fusion Technology Co. Ltd.)</p>		

28PM2-1: Nonlinear Circuits and Systems 1

Date: 28 February, 4:00pm to 6:00pm HST (1 March, 11:00am to 1:00pm JST)

Room: Zoom Meeting Room1

Chair: Tatsuki Osato (NIT, Hachinohe College)

28PM2-1-1	Safe Driving System for Electric Wheelchair with Balloon-type Pneumatic Interface	41
<p>Kosei Hirano (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University), Shinjiro Takata (Tokushima National Hospital)</p>		
28PM2-1-2	Data Acquisition System of Human Skillful Operation Using Master-Slave Robot Manipulator	45
<p>Yuto Yamada (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)</p>		
28PM2-1-3	A Novel Hybrid Wireless Power Transfer System for Battery Charging Applications	49
<p>Wenqi Zhu (Chiba University), Yutaro Komiyama (Chiba University), Kien Nguyen (Chiba University), Hiroo Sekiya (Chiba University)</p>		
28PM2-1-4	Analysis and Design of Push-pull Load-independent Class-E Frequency Tripler	53
<p>Yinchen Xie (Chiba University), Wenqi Zhu (Chiba University), Yutaro Komiyama (Chiba University), Kien Nguyen (Chiba University), Hiroo Sekiya (Chiba University)</p>		
28PM2-1-5	Optimization of Shape of PSI for Rotation Angle Measurement System with Three PSIs	57
<p>Ryota Masumoto (Hiroshima Institute of Technology), Keito Ohshita (Hiroshima Institute of Technology), Masayuki Yamauchi (Hiroshima Institute of Technology)</p>		
28PM2-1-6	Study on Precision Recall by Using van der Pol Oscillators with Third-Power and Fifth-Power for Associative Memory	61

Yukinojo Kotani (Tokushima University), Kento Fukuta (Tokushima University), Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

28PM2-2: Artificial Intelligence and Machine Learning 2

Date: 28 February, 4:00pm to 6:00pm HST (1 March, 11:00am to 1:00pm JST)

Room: Zoom Meeting Room2

Chair: Yihsin Ho (Takushoku University)

- 28PM2-2-1 Growth stage estimation of cabbage plants by deep learning** 65
Jonggeol Park (Tokyo University of Information Sciences), JiuYun Zhang (Tokyo University of Information Sciences)
- 28PM2-2-2 Combined Use of Federated Learning and Image Encryption for Privacy-Preserving Image Classification with Vision Transformer** 66
Teru Nagamori (Tokyo Metropolitan University), Hitoshi Kiya (Tokyo Metropolitan University)
- 28PM2-2-3 A Privacy Preserving Method with a Random Orthogonal Matrix for ConvMixer Models** 70
Rei Aso (Tokyo Metropolitan University), Tatsuya Chuman (Tokyo Metropolitan University), Hitoshi Kiya (Tokyo Metropolitan University)
- 28PM2-2-4 Color-NeuraCrypt: Privacy-Preserving Color-Image Classification Using Extended Random Neural Networks** 74
Zheng Qi (Tokyo Metropolitan University), AprilPyone MaungMaung (Tokyo Metropolitan University), Hitoshi Kiya (Tokyo Metropolitan University)
- 28PM2-2-5 Color Image Demosaicking via SwinIR** 78
Ai Tsuchihashi (Tamagawa University), Daiki Arai (Tamagawa University), Taishi Iriyama (Saitama University), Masatoshi Sato (Tamagawa University), Hisashi Aomori (Chukyo University), Tsuyoshi Otake (Tamagawa University)
- 28PM2-2-6 Bit Depth Expansion Network Considering Layer Attention** 82
Noriya Kondoh (Tamagawa University), Daiki Arai (Tamagawa University), Taishi Iriyama (Saitama University), Masatoshi Sato (Tamagawa University), Hisashi Aomori (Chukyo University), Tsuyosi Otake (Tamagawa University)

28PM2-3: Signal Processing

Date: 28 February, 4:00pm to 6:00pm HST (1 March, 11:00am to 1:00pm JST)

Room: Zoom Meeting Room3

Chair: Xiuqin Wei (Chiba Institute of Technology)

- 28PM2-3-1 Initial research developing equipment for multimodal analysis to evaluate swallowing function** 86
Yujiro Sawanobori (University of Yamanashi), Yutaka Suzuki (Toyo University), Masayuki Morisawa (University of Yamanashi)
- 28PM2-3-2 Classification of Ripple Waves into Experienced Episodes Using CNN** 90

Yuta Ishihara (Kagawa University), Ken'ichi Fujimoto (Kagawa University), Hiroshi Murai (Yamaguchi University), Junko Ishikawa (Yamaguchi University), Dai Mitsushima (Yamaguchi University)

28PM2-3-3 Real-time Moving Blind Source Extraction based on Constant Separating Vector and Auxiliary Function Technique 94

Sihan Yuan (Waseda University), Tetsuya Ueda (Waseda University), Shoji Makino (Waseda University)

28PM2-3-4 Generation-based entity typing in knowledge graphs using a pretrained model 98

Kosuke Aigo (Shizuoka University), Takashi Takashi (Shizuoka University), Masafumi Nishida (Shizuoka University), Masafumi Nishimura (Shizuoka University)

28PM2-3-5 Combination of Binary and Ratio Masks with Frequency Domain Subband Division for DNN-based Single-Channel Speech Separation 102

Peng Chen (Ritsumeikan University), Yuting Geng (Ritsumeikan University), Kenta Iwai (Ritsumeikan University), Takanobu Nishiura (Ritsumeikan University)

28PM2-3-6 Flower Group Detection for Cherry Tomato Fruiting Treatment Robot Using Depth Camera 106

Jun Shimazaki (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)

28PM3-1: Wireless Communication Systems 2

Date: 28 February, 7:00pm to 9:00pm HST (1 March, 2:00pm to 4:00pm JST)

Room: Zoom Meeting Room1

Chair: Yue Su (Chiba University)

28PM3-1-1 Programming Learning Support System using Digital Textbook and Exercise Management Systems 110

Hatsune Ochiai (Tamagawa University), Takafumi Tanaka (Tamagawa University)

28PM3-1-2 A Characteristic Analysis of GLDM in Introduction Scheme of Next-Generation DTTB 114

Masashi Sekiguchi (Kanagawa University), Takashi Komatsu (Kanagawa University), Akira Nakamura (Kanagawa University), Makoto Itami (Tokyo University of Science)

28PM3-1-3 A Study on Multi-Stream Transmission Using Generalized Imperfect Block Diagonalization for MU-MIMO Downlink 118

Tadatomo Sato (NIT Kagoshima College), Teruji Ide (NIT Kagoshima College)

28PM3-1-4 Adaptive Zero Hybrid Guard Interval for Multiuser Diversity DFTs-OFDMA 122

Kojiro Nakano (Yamaguchi University), Yuta Ida (Yamaguchi University), Takahiro Matumoto (Kagosima University)

28PM3-1-5 Deep Learning Compensation for Multiuser Diversity OFDMA without Guard Interval 126

Shunsuke Tsumori (Yamaguchi University), Yuta Ida (Yamaguchi University), Sho Kuroda (FX Systems Corporation), Takahiro Matsumoto (Kagoshima University)

28PM3-1-6 A Preliminary Evaluation of Millimeter-Wave Communications for Information-Centric Wireless Sensor Networks 130

Shintaro Mori (Fukuoka University)

28PM3-2: Artificial Intelligence and Machine Learning 3

Date: 28 February, 7:00pm to 9:00pm HST (1 March, 2:00pm to 4:00pm JST)

Room: Zoom Meeting Room2

Chair: Yasuteru Hosokawa (Shikoku University)

- 28PM3-2-1 An Application for Searching Sheep based on Machine Learning by Drone** 131
Chengyuan Dong (Takushoku University), Yihsin Ho (Takushoku University)
- 28PM3-2-2 Behavior Recognition and Monitoring System for Office Workers by Deep Learning from Two Surveillance Cameras** 134
Atsushi Ogino (Konan University), Masahiro Tanaka (Konan University)
- 28PM3-2-3 Determining cavities in fresh concrete using sparse estimation and self-organizing maps** 138
Kota Takane (University of Yamanashi), Shion Ikeda (University of Yamanashi), Masayuki Morisawa (University of Yamanashi), Yutaka Suzuki (Toyo University)
- 28PM3-2-4 Reservoir Computing using Cellular Automata for Predicting Time Series** 142
Riku Tooyama (Nagaoka University of Technology), Tadashi Tsubone (Nagaoka University of Technology)
- 28PM3-2-5 Estimation of Temperature and Humidity Spatial Distribution in Horticultural Greenhouses Using Machine Learning** 146
Sonoka Yamashita (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)
- 28PM3-2-6 Prediction Model of Wind Speed and Direction Using CNN and CLSTM with Vector Images Input** 150
Hiroto Kanagawa (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)

1AM1-1: Nonlinear Circuits and Systems 2

Date: 1 March, 9:00am to 10:20am

Room: PLUMERIA

Chair: Takayuki Kimura (Nippon Institute of Technology)

- 1AM1-1-1 Synchronization of Bi-Directionally Coupled Chaotic Circuits with Non-Uniform Coupling Strength** 154
Yuki Matsubara (Tokushima University), Yuki Ishikawa (Tokushima University), Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)
- 1AM1-1-2 Chimera States in a Two-Group Networks of Kuramoto model** 158
Toru Kumagawa (Tokushima University), Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

1AM1-1-3	An Easy-to-Use Design Approach of Class-E-D WPT System	162
Hiroki Kagawa (Chiba Institute of Technology), Takuya Iwami (Chiba Institute of Technology), Yota Matui (Chiba Institute of Technology), Wei Xiuqin (Chiba Institute of Technology)		
1AM1-1-4	Power Losses and efficiency of Class-E-D WPT System at Any Output Voltage	166
Takuya Iwami (Chiba Institute of Technology), Hiroki Kagawa (Chiba Institute of Technology), Xiuqin Wei (Chiba Institute of Technology)		

1AM1-2: Artificial Intelligence and Machine Learning 4

Date: 1 March, 9:00am to 10:40am
Room: PAKALANA & ANTHURIUM
Chair: Kenichi Shibata (RIKEN AIP)

1AM1-2-1	Prediction Model of Solar Radiation Based on Weather Forecast and MSM-GPV Using Deep Neural Network	170
Tomohiro Aoki (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)		
1AM1-2-2	Image classification with SVM for CMOS sensor generating a vector image	174
Haruto Oki (Ritsumeikan University), Kota Yoshida (Ritsumeikan University), Shunsuke Okura (Ritsumeikan University)		
1AM1-2-3	Tackling Over-smoothing on Temporal Convolutional Networks for Operating Work Segmentation	178
Keisuke Nakamura (Shizuoka University), Yoshitaka Yamamoto (Shizuoka University), Masafumi Nishimura (Shizuoka University), Yuki Shiono (Yamaha Motor Co. Ltd.), Reiki Shirasawa (Yamaha Motor Co. Ltd.), Takayuki Nakano (Yamaha Motor Co. Ltd.), Takahiro Aoki (Shizuoka University and Yamaha Motor Co. Ltd.)		
1AM1-2-4	High-accuracy reading technology for QR codes embedded in 3D printed object using an autoencoder	182
Hideyuki Torii (Kanagawa Institute of Technology), Masahiro Suzuki (Seisen University), Kazutake Uehira (Kanagawa Institute of Technology)		
1AM1-2-5	Non-profiled DL-SCA using Clustering on Latent Variables of Autoencoder: AE-SCA	186
Kunihiro Kuroda (Ritsumeikan University), Yuta Fukuda (Ritsumeikan University), Kota Yoshida (Ritsumeikan University), Takeshi Fujino (Ritsumeikan University)		

1AM2-1: Nonlinear Circuits and Systems 3

Date: 1 March, 11:00am to 12:20pm
Room: PLUMERIA
Chair: Hideyuki Kato (Oita University)

1AM2-1-1	Design of Load-Independent Class-EF Inverter with Nonsinusoidal Output Current	190
-----------------	---	-----

Aoi Noda (Chiba Institute of Technology), Yota Matsui (Chiba Institute of Technology), Weisen Luo (Chiba Institute of Technology), Xiuqin Wei (Chiba Institute of Technology)

1AM2-1-2 Wireless Power Transfer System with Series Resonant Inverse Class-E Inverter 194

Yutaro Komiyama (Chiba University), Wenqi Zhu (Chiba University), Xiuqin Wei (Chiba Institute of Technology), Kien Nguyen (Chiba University), Hiroo Sekiya (Chiba University)

1AM2-1-3 Synchronization Phenomena in Complex Oscillatory Networks with Switching Coupling 198

Haruka Sakohira (Tokushima University), Kiichi Yamashita (Tokushima University), Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

1AM2-1-4 Synchronization of Chaos Networks by Changing Circuit Layout Distribution 202

Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

1AM2-2: Sound and Speech Processing

Date: 1 March, 11:00am to 1:00pm

Room: PAKALANA & ANTHURIUM

Chair: Nozomiko Yasui (Saitama University)

1AM2-2-1 Timbre Uniformity Visualization for Percussion Training Using Contrastive Loss 206

Akinori Maeda (Shizuoka University), Masafumi Nishimura (Shizuoka University)

1AM2-2-2 Improved Throat Microphone Speech Recognition Using a Self-supervised Learning Model 210

Kohta Masuda (Shizuoka University), Jun Ogata (National Institute of Advanced Industrial Science and Technology), Masafumi Nishida (Shizuoka University), Masafumi Nishimura (Shizuoka University)

1AM2-2-3 Contrastive Mask Selection and Inpainting Convolution for Few-shot Anomalous Sound Detection 214

Ryosuke Tanaka (Gifu University), Junya Yamashita (Gifu University), Keisuke Ikeda (Gifu University), Satoshi Tamura (Gifu University), Satoru Hayamizu (Gifu University)

1AM2-2-4 ANC System with Multiple Parametric Array Loudspeakers for Stable Noise Reduction Against Obstacles 218

Kazuho Yamaguchi (Nippon Institute of Technology), Masanori Kimoto (Nippon Institute of Technology)

1AM2-2-5 Improvement of Performance for Feedback Active Noise Control in the Frequency Domain 222

Ryota Noguchi (Saitama university), Yosuke Sugiura (Saitama university), Nozomiko Yasui (Saitama university), Tetsuya Shimamura (Saitama university)

1AM2-2-6 Amplitude Spectrogram Prediction from Mel-Frequency Cepstrum Coefficients and Loudness Using Deep Neural Networks 225

Shoya Kawaguchi (National Institute of Technology Kagawa College), Daichi Kitamura (National Institute of Technology Kagawa College)

1AM2-3: Wireless Communication Systems 3

Date: 1 March, 11:00am to 12:40pm
Room: ILIMA
Chair: Hiraku Okada (Nagoya University)

- 1AM2-3-1 Simulation of Underwater Acoustic Communication Using a Directional Transducer Consisting of Multiple Reflectors** 229
Ryotaro Chinone (University of Tsukuba), Tadashi Ebihara (University of Tsukuba), Yuji Sato (University of Tsukuba), Naoto Wakatsuki (University of Tsukuba), Yuka Maeda (University of Tsukuba), Koichi Mizutani (University of Tsukuba)
- 1AM2-3-2 Measurement of Delay and Doppler Spreads in Shallow Water Environment for Mobile Underwater Acoustic Communication** 233
Takuya Waki (University of Tsukuba), Tadashi Ebihara (University of Tsukuba), Naoto Wakatsuki (University of Tsukuba), Keiichi Zempo (University of Tsukuba), Koichi Mizutani (University of Tsukuba)
- 1AM2-3-3 3D indoor positioning system using tensor rank minimization based radio map interpolation** 237
Makoto Osawa (Tokyo University of Science), Norisato Suga (Shibaura Institute of Technology), Yoshihiko Tsuchiya (Tokyo University of Science), Masaya Fujisawa (Tokyo University of Science)
- 1AM2-3-4 A Study on Reinforcement Learning Algorithms to Reduce Power Consumption on BLE Advertisements with Maintaining Reliability** 241
Minoru Fujisawa (Tokyo University of Science), Hiroyuki Yasuda (The University of Tokyo), Ryosuke Isogai (SEIKO FUTURE CREATION INC.), Yoshifumi Yoshida (SEIKO FUTURE CREATION INC.), Song-Ju Kim (SOBIN Institute LLC.), Mikio Hasegawa (Tokyo University of Science)
- 1AM2-3-5 Evaluation of IoT Malware-Disabling Method Using Large-Scale IoT Simulator** 245
Yuki Ishida (SecureBrain), Kazuki Takada (SecureBrain), Kazuki Iwamoto (SecureBrain), Takeshi Misu (SecureBrain)

1PM1-1: SS2. Neural Prosthesis and WiBIC 1

Date: 1 March, 2:00pm to 3:40pm
Room: PLUMERIA
Chair: Hiroyuki Torikai (Hosei University)

- 1PM1-1-1 A Modified Hardware-Efficient Cochlear Model based on Ergodic Cellular Automaton Dynamics** 249
Itsuki Kubota (Hosei University), Hiroyuki Torikai (Hosei University)
- 1PM1-1-2 Learning Attribute Curvilinear Coordinates for Pretrained Deep Generative Model** 253
Takehiro Aoshima (Osaka University), Takashi Matsubara (Osaka University)
- 1PM1-1-3 Temporal Deep Unfolding-based MPC for Controlling Firing Patterns of Neuronal Network** 257
Jumpei Aizawa (Osaka University), Masaki Ogura (Osaka University), Masanori Shimono (Kyoto University), Naoki Wakamiya (Osaka University)
- 1PM1-1-4 A hardware-efficient FPGA neuron model toward virtual clinical trial of brain prosthesis** 261

Haruto Suzuki (Hosei University), Hiroyuki Torikai (Hosei University)

1PM1-1-5 Inverse Heat Dissipation Model for Image Segmentation 265

Yu Kashihara (Osaka University), Takashi Matsubara (Osaka University)

1PM1-2: Artificial Intelligence and Machine Learning 5

Date: 1 March, 2:00pm to 3:40pm

Room: PAKALANA & ANTHURIUM

Chair: Tetsuya Shimamura (Saitama University)

1PM1-2-1 Application of multimodal methods to sign language motion classification and its effectiveness evaluation 269

Tsukasa Wakao (Kanagawa Institute of Technology), Yuusuke Kawakita (Kanagawa Institute of Technology), Hiromitsu Nishimura (Kanagawa Institute of Technology), Hiroshi Tanaka (Kanagawa Institute of Technology), Jin Mitsugi (Keio University)

1PM1-2-2 Multi Agent Deep Deterministic Policy Gradient based Fixed Wing Unmanned Aerial Vehicle Collision Avoidance System 273

Yuuki Watanabe (Ritsumeikan University), Tomohiro Fujita (Ritsumeikan University)

1PM1-2-3 Temporal convolutional networks with feature selection for human manufacturing action analysis 277

Yuto Shimizu (Shizuoka University), Yoshitaka Yamamoto (Shizuoka University), Masafumi Nishimura (Shizuoka University), Yuki Shiono (Yamaha Motor Co. Ltd.), Reiki Shirasawa (Yamaha Motor Co. Ltd.), Takayuki Nakano (Yamaha Motor Co. Ltd.), Takahiro Aoki (Shizuoka University and Yamaha Motor Co. Ltd.)

1PM1-2-4 Multi-layer Cortical Learning Algorithm for Trend Changing Time-series Forecast 281

Kazushi Fujino (The University of Electro-Communications), Takeru Aoki (Tokyo University of Science), Keiki Takadama (The University of Electro-Communications), Hiroyuki Sato (The University of Electro-Communications)

1PM1-2-5 Estimating children's classroom participation using machine learning methods 285

Mayuko Maruyama (Tamagawa University), Masahiro Miyata (Tamagawa University), Tetsuji Yamada (Tamagawa University), Takeshi Aihara (Tamagawa University), Takashi Omori (Tamagawa University)

1PM1-3: Communication & Sensor Networks

Date: 1 March, 2:00pm to 3:40pm

Room: ILIMA

Chair: Kosuke Sanada (Mie University)

1PM1-3-1 A Guaranteed QoE Provision using Software Defined Networking and Cryptocurrency 289

Hideya Masaki (Chiba University), Kien Nguyen (Chiba University), Hiroo Sekiya (Chiba University)

1PM1-3-2 Contents Acquisition Method Using Caching List in the Information-Centric Wireless Multi-Hop Networking 293

Shogo Hinata (Kanagawa Institute of Technology), Shigeki Shiokawa (Kanagawa Institute of Technology)

1PM1-3-3 High Speed Optimization of NOMA System Using Coherent Ising Machine in Dynamic Environment 297

Tepei Otsuka (Tokyo University of Science), Aohan Li (The University of Electro-Communications), Hiroki Takesue (NTT Basic Research Laboratories NTT Corporation), Kensuke Inaba (NTT Basic Research Laboratories NTT Corporation), Kazuyuki Aihara (International Research Center for Neurointelligence The University of Tokyo), Mikio Hasegawa (Tokyo University of Science)

1PM1-3-4 Performance Demonstration of Decentralized TDMA Based on Desynchronization of Nonlinear Oscillators with Different Coupling Schemes 301

Takuma Osada (Tokyo University of Science), Hiroyuki Yasuda (The University of Tokyo), Mikio Hasegawa (Tokyo University of Science)

1PM1-3-5 A Novel Energy Efficient Clustering Using a Sleep Awake Algorithm for Energy Harvesting Wireless Sensor Networks 305

Shuntaro Takie (Tokyo University of Science), Ryo Shibata (Tokyo University of Science), Hiroyuki Yashima (Tokyo University of Science)

1PM2-1: SS2. Neural Prosthesis and WiBIC 2

Date: 1 March, 4:00pm to 5:20pm

Room: PLUMERIA

Chair: Hiroyuki Torikai (Hosei University)

1PM2-1-1 Nonlinear Sound Processing Functions of An FPGA Integrated Cochlear Model 309

Yui Kishimoto (Hosei University), Hiroyuki Torikai (Hosei University)

1PM2-1-2 On Loss Function for Deep Learning of Physical Systems 313

Takahito Yoshida (Graduate School of Engineering Science Osaka University), Takaharu Yaguchi (Graduate School of System Informatics Kobe University), Takashi Matsubara (Graduate School of Engineering Science Osaka University)

1PM2-1-3 Platform Design for Wireless Brain-Inspired Computing 317

Ryuji Nagazawa (Chiba University), Jiaying Lin (Chiba University), Kien Nguyen (Chiba University), Won-Joo Hwang (Busan National University), Hiroyuki Torikai (Hosei University), Mikio Hasegawa (Tokyo University of Science), Hiroo Sekiya (Chiba University)

1PM2-1-4 Analysis of influence of wireless communication on dynamics of neural networks 321

Shota Kawakami (Osaka University), Naoki Wakamiya (Osaka University)

1PM2-2: Image & Video Signal Processing

Date: 1 March, 4:00pm to 5:20pm

Room: PAKALANA & ANTHURIUM

Chair: Masatoshi Sato (Tamagawa University)

1PM2-2-1	APDID: IQA Database Specialized For Printing Images	325
Ryosuke Tonegawa (Saitama University), Yosuke Sugiura (Saitama University), Nozomiko Yasui (Saitama University), Tetsuya Shimamura (Saitama University)		
1PM2-2-2	Detection Method of Leaf Cutting Point for Tomato Leafcutter Robot Using Depth Camera	329
Hirokazu Kariyama (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)		
1PM2-2-3	Telephone Unit Detection and LED Color Recognition by Image Processing	333
Shuto Suzuki (Gifu University), Junya Sato (Gifu University), Ryoya Suzuki (IWATSU ELECTRIC Co. LTD.), Ichiro Sudo (IWATSU ELECTRIC Co. LTD.), Kyosuke Yamawaki (IWATSU ELECTRIC Co. LTD.)		
1PM2-2-4	Misplacement Detection of a Forged Part by Image Processing	337
Mizuki Ito (Gifu University), Junya Sato (Gifu University), Kosei Umemura (ASAHI FORGE CORPORATION), Chikara Ito (ASAHI FORGE CORPORATION), Hidenobu Masuda (ASAHI FORGE CORPORATION)		
1PM2-2-5	Visual Archive Search Using Vision-language Object Detection Models	340
Ryuichi Tomiya (Kobe University), Tristan Hascoet (Kobe University), Ryoichi Takashima (Kobe University), Tetsuya Takiguchi (Kobe University)		

1PM2-3: SS1. Recent Progress of VLC for 6G

Date: 1 March, 4:00pm to 5:20pm
Room: ILIMA
Chair: Shintaro Arai (Okayama University of Science)

1PM2-3-1	Development of An Experimental System for Image Sensor Communication Using a Rotary LED Transmitter and Low-Speed Camera Receiver	344
Shintaro Arai (Okayama University of Science), Zhengqiang Tang (Nagoya University), Tomohiro Yendo (Nagaoka University of Technology)		
1PM2-3-2	Non-uniform Grid-based Optical Fingerprint Positioning on VN-CSK System	348
Daisuke Ogawa (Ibaraki University), Yuta Ochiai (Ibaraki University), Yusuke Kozawa (Ibaraki University), Hiromasa Habuchi (Ibaraki University)		
1PM2-3-3	Comparison of Trilateration Method and Optical Fingerprinting Method Based on Optical-Wireless VN-CodeSK System	352
Yuta Ochiai (Ibaraki University), Daisuke Ogawa (Ibaraki University), Yusuke Kozawa (Ibaraki University), Hiromasa Habuchi (Ibaraki University)		
1PM2-3-4	A Proposal of Hidden Screen-Camera Communication Systems Using Adversarial Examples on CNN Depth Estimation Model	356
Changseok Lee (Nagoya University), Hiraku Okada (Nagoya University), Tadahiro Wada (Shizuoka University), Chedlia Ben Naila (Nagoya University), Masaaki Katayama (Nagoya University)		
1PM2-3-5	Enhanced xASK-CodeSK for SLIPT	360

Yu Ichitsuka (Ibaraki University), Yusuke Kozawa (Ibaraki University), Hiromasa Habuchi (Ibaraki University)

2AM1-1: Nonlinear Applications

Date: 2 March, 9:20am to 10:40am

Room: PLUMERIA

Chair: Yoshitaka Itoh (Hokkaido University of Science)

2AM1-1-1 Attitude Control of Biped Hopping Robot Using an Inertial Rotor 364

Ayumu Kato (Tokushima University), Hiroshi Suzuki (Tokushima University), Takahiro Kitajima (Tokushima University), Akinobu Kuwahara (Tokushima University), Takashi Yasuno (Tokushima University)

2AM1-1-2 Local Search Method for Solving Min-Max multiple Bike Sharing System Routing Problem 368

Takafumi Matsuura (Nippon Institute of Technology)

2AM1-1-3 Similarity-based Multi-factorial Evolutionary Algorithm for Binary Optimization Problems 372

Shio Kawakami (The University of Electro-Communications), Shoichiro Tanaka (The University of Electro-Communications), Keiki Takadama (The University of Electro-Communications), Hiroyuki Sato (The University of Electro-Communications)

2AM1-1-4 Improving Signal Detection Performance of Successive Interference Cancellation with Nonlinear System by Applying Stochastic Resonance 376

Yuta Tomida (Mie University), Hiroyuki Hatano (Mie University), Kosuke Sanada (Mie University), Kazuo Mori (Mie University)

2AM1-2: Artificial Intelligence and Machine Learning for Time Series

Date: 2 March, 9:20am to 10:40am

Room: PAKALANA & ANTHURIUM

Chair: Hiroshi Suzuki (Tokushima University)

2AM1-2-1 Investigation of Sound Data with Three Types of Noise-Mixing Effects by Neural Network Using Autocorrelation Function 380

Takuya Nakamura (Tokushima University), Ryosuke Shimizu (Tokushima University), Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

2AM1-2-2 Time Series Classification Using Neural Networks with Chaotic Feature Extraction For Multiple Data 384

Ryosuke Shimizu (Tokushima University), Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

2AM1-2-3 Effects of synaptic scaling on spontaneous firing activity in spiking neural networks with modular structure 388

Takumi Shinkawa (Oita University), Hideyuki Kato (Oita University), Yoshitaka Ishikawa (Future University Hakodate), Takuma Sumi (Tohoku University), Hideaki Yamamoto (Tohoku University), Yuichi Katori (Future University Hakodate)

2AM1-2-4	Preliminary Study of Adaptive Synapse Generation in Cortical Learning Algorithm	392
Takeru Aoki (Tokyo University of Science), Keiki Takadama (The University of Electro-Communications), Hiroyuki Sato (The University of Electro-Communications)		

2AM2-1: Wireless Communication Systems 4

Date: 2 March, 11:00am to 12:20pm
Room: PLUMERIA
Chair: Kien Nguyen (Chiba University)

2AM2-1-1	Routing and Caching Optimization in Autonomous Mobility-Assited Piggyback Network with mmWave Links	396
Daisuke Yamamoto (Tokyo University of Science), So Hasegawa (National Institute of Information and Communications Technology), Yozo Shoji (National Institute of Information and Communications Technology), Mikio Hasegawa (Tokyo University of Science)		

2AM2-1-2	A study of Direct Decoding Adopting LDM in Partial Reception Band in Next-Generation Digital Terrestrial Television Broadcasting	400
Yoko Tanaka (Tokyo University of Science), Akira Nakamura (KanagawaUniversity), Makoto Itami (Tokyo University of Science)		

2AM2-1-3	IRS Reflection Pattern Prediction Considering Receiver's Moving Speed	404
Yoshihiko Tsuchiya (Tokyo University of Science), Norisato Suga (Sugaura Institute of Technology), Kazunori Uruma (Kogakuin University), Masaya Fujisawa (Tokyo University of Science)		

2AM2-1-4	Improvement of Automated Modulation Classification Using Independent Component Analysis	408
Naoyuki Funabashi (Saitama University), Yosuke Sugiura (Saitama University), Nozomiko Yasui (Saitama University), Tetsuya Shimamura (Saitama University)		

2AM2-2: Applications of Signal Processing

Date: 2 March, 11:00am to 12:40pm
Room: PAKALANA & ANTHURIUM
Chair: Tomohiro FUJITA (Ritsumeikan University)

2AM2-2-1	Forex Trading Strategy That Might Be Executed Due to the Popularity of Gotobi Anomaly	412
Hiroki Bessho (Ibaraki University), Takanari Sugimoto (Gaika ex byGMO Inc.), Tomoya Suzuki (Ibaraki University)		

2AM2-2-2	Long-Term Modeling of Financial Machine Learning with Multiple Time Scales	416
Kazuki Amagai (Ibaraki University), Riku Tanaka (Daiwa Asset Management Co.Ltd.), Tomoya Suzuki (Ibaraki University and Daiwa Asset Management Co.Ltd.)		

2AM2-2-3	Composition of Thematic Equity Funds by Searching Multi and Unknown Words	420
Zijie Luo (Ibaraki University), Ziyi Dai (Ibaraki University), Tomoya Suzuki (Ibaraki University), Wataru Kuramoto (Daiwa Asset Management Co.Ltd)		

- 2AM2-2-4 A parallel nuclear norm minimization algorithm for matrix rank minimization problems** 424
 Katsumi Konishi (Hosei University), Tyohei Sasaki (Tokyo University of Technology)
- 2AM2-2-5 Investigation of Partial Update and Source Localization in Geometrically Constrained Independent Vector Analysis with Auxiliary Function Approach for Moving Source** 426
 Kana Goto (University of Tsukuba), Tetsuya Ueda (Waseda University), Li Li (NTT Communication Science Laboratories Nippon Telegraph and Telephone Corporation), Takeshi Yamada (University of Tsukuba), Shoji Makino (Waseda University)

3AM1-1: Bifurcation and Chaos

Date: 2 March, 11:00am to 12:20pm
 Room: PLUMERIA
 Chair: Takashi Matsubara (Osaka University)

- 3AM1-1-1 Information entropy of transition probability matrix obtained from chaotic time series data** 430
 Akinori Kato (Tokyo Denki University), Yoshitaka Itoh (Hokkaido University of Science), Masaharu Adachi (Tokyo Denki University)
- 3AM1-1-2 Verifying Robustness of Parameter Space Estimation for Predicting a Critical Transition** 434
 Yoshitaka Itoh (Hokkaido University of Science)
- 3AM1-1-3 Periodic Input Leads an Izhikevich Neuron to Induce both Periodic and Irregular Responses** 438
 Yota Tsukamoto (Tokyo University of Science), Honami Tsushima (Tokyo University of Science), Tohru Ikeguchi (Tokyo University of Science)
- 3AM1-1-4 Performance evaluation of chaotic search with stochastic solution transitions for various types of Electric Vehicle Routing Problems with Time Windows** 442
 Jun Adachi (Nippon Institute of Technology), Takafumi Matsuura (Nippon Institute of Technology), Takayuki Kimura (Nippon Institute of Technology)

3AM1-2: Artificial Intelligence and Machine Learning for Image Processing

Date: 2 March, 11:00am to 1:00pm
 Room: PAKALANA & ANTHURIUM
 Chair: Gengtao Lin (Keio University)

- 3AM1-2-1 RGB-FIR object detection considering camera-to-camera misalignment** 446
 Masaya Hojyo (Ritsumeikan university), Masato Okuda (Ritsumeikan university), Kota Yoshida (Ritsumeikan university), Takeshi Fujino (Ritsumeikan university)
- 3AM1-2-2 Improving Robustness of Adversarial Examples Generated by Fault Injection Attack on MIPI** 450
 Tatsuya Oyama (Ritsumeikan University), Kota Yoshida (Ritsumeikan University), Shunsuke Okura (Ritsumeikan University), Takeshi Fujino (Ritsumeikan University)

3AM1-2-3	Bit-Depth limited Demosaicking using Predictive Filter Flow	454
Daiki Arai (Tamagawa University), Taishi Iriyama (Saitama University), Masatoshi Sato (Tamagawa University), Hisashi Aomori (Chukyo University), Tsuyoshi Otake (Tamagawa University)		
3AM1-2-4	Cross-modal image-to-text retrieval with self-supervised contrastive learning	458
Yusuke Kato (Gifu University), Satoshi Tamura (Gifu University)		
3AM1-2-5	Zero-shot evaluation index based on robustness of CNN output	462
Chisato Takahashi (Tokyo City University), Kenya Jin'no (Tokyo City University)		
3AM1-2-6	A Study of the Role of Latent Variables Using Three-Dimensional Shapes	466
Saki Okamoto (Tokyo City University), Kenya Jin'no (Tokyo City University)		

3PM1-1: IoT Applications

Date: 1 March, 2:00pm to 3:40pm
Room: PLUMERIA
Chair: Naoki Wakamiya (Osaka University)

3PM1-1-1	COLLABORATIVE LEARNING SUPPORT ENVIRONMENT UTILIZING GRAPH DOCUMENTS	470
Kenichi Shibata (RIKEN AIP), Shuichi Aono (Tamagawa University)		
3PM1-1-2	Composing an IoT platform using AWS - environment measurement of laboratory and student attendance management -	474
Yutaro Takada (Kanagawa Institute of Technology), Kazuki Odagiri (Kanagawa Institute of Technology), Ryusei Okamura (Kanagawa Institute of Technology), Kohki Akashi (Kanagawa Institute of Technology), Hiroshi Tanaka (Kanagawa Institute of Technology), Yasuhiro Sudo (Kanagawa Institute of Technology)		
3PM1-1-3	Dynamic Visualization of Basic High-Order Functions for Learning Functional Programming	478
Hidekazu Shiozawa (Tamagawa University), Takumi Shimura (Tamagawa University), Koki Asakawa (Tamagawa University), Takafumi Tanaka (Tamagawa University)		
3PM1-1-4	Supporting Participants' Synchronized Hand Gestures on a Video Conferencing System	482
Kan Oyama (Graduate School of Engineering Tamagawa University), Hidekazu Shiozawa (College of Engineering Tamagawa University)		
3PM1-1-5	Feasibility Study of Daily-activity Recognition Using Compressed Sensing	486
Shion OTA (Ritsumeikan University), Tomohiro FUJITA (Ritsumeikan University)		

3PM1-2: Biomedical Signal Processing

Date: 1 March, 2:00pm to 3:40pm
Room: PAKALANA & ANTHURIUM
Chair: Yukihiro Nomura (Chiba University)

3PM1-2-1	Identification of sexually dimorphic effect of oxytocin intranasal administration on B6J mice electroencephalography	490
Clarissa Genevieve Gregory (Keio University), Yasue Mitsukura (Keio University)		
3PM1-2-2	Prefrontal Power Asymmetry Feature Extraction for Depression Severity in a Clinical Study	494
Gengtao Lin (Keio University), Yasue Mitsukura (Keio University)		
3PM1-2-3	Separation of Masticatory and Swallowing Sounds Using Wavelet Analysis	498
Yuto Yamamura (Toyo University), Yutaka Suzuki (Toyo University), Nobuyuki Terada (Toyo University), Shuya Shida (Toyo University)		
3PM1-2-4	EEG Current Source Localization Using Deep Prior	502
Naoki Hojo (Kobe University), Hajime Yano (Kobe University), Ryoichi Takashima (Kobe University), Tetsuya Takiguchi (Kobe University), Seiji Nakagawa (Chiba University)		
3PM1-2-5	Effect of Frequency Bands of Vehicle Sound Components on Attentional Mechanisms Using Event-Related Potentials	506
Yuki Kameyama (Hiroshima City University), Shunsuke Ishimitsu (Hiroshima City University), Keisuke Kotaka (TOYOBO CO. LTD.), Yasuto Fujii (TOYOBO CO. LTD.)		

Author Index by Session

A

Adachi, Masaharu: 14(3AM1-1-1)
Adachi, Jun: 14(3AM1-1-4)
Aigo, Kosuke: 4(28PM2-3-4)
Aihara, Takeshi: 9(1PM1-2-5)
Aihara, Kazuyuki: 10(1PM1-3-3)
Aizawa, Jumpei: 8(1PM1-1-3)
Akashi, Kohki: 15(3PM1-1-2)
Amagai, Kazuki: 13(2AM2-2-2)
Aoki, Takahiro: 6(1AM1-2-3), 9(1PM1-2-3)
Aoki, Tomohiro: 6(1AM1-2-1)
Aoki, Takeru: 9(1PM1-2-4), 12(2AM1-2-4)
Aomori, Hisashi: 3(28PM2-2-5), 3(28PM2-2-6),
14(3AM1-2-3)
Aono, Shuichi: 15(3PM1-1-1)
Aoshima, Takehiro: 8(1PM1-1-2)
Arai, Daiki: 3(28PM2-2-5), 3(28PM2-2-6),
14(3AM1-2-3)
Arai, Shintaro: 11(1PM2-3-1)
Asakawa, Koki: 15(3PM1-1-3)
Aso, Rei: 3(28PM2-2-3)

B

Bessho, Hiroki: 13(2AM2-2-1)

C

Chen, Peng: 4(28PM2-3-5)
Chinone, Ryotaro: 8(1AM2-3-1)
Chuman, Tatsuya: 3(28PM2-2-3)

D

Dai, Ziyi: 13(2AM2-2-3)
Dong, Chengyuan: 5(28PM3-2-1)

E

Ebihara, Tadashi: 8(1AM2-3-1), 8(1AM2-3-2)
Endo, Michitaka: 2(28PM1-2-5)

F

Fujii, Yasuto: 16(3PM1-2-5)
Fujimoto, Kenichi: 2(28PM1-2-5)
Fujimoto, Ken'ichi: 3(28PM2-3-2)
Fujino, Takeshi: 6(1AM1-2-5), 14(3AM1-2-1),
14(3AM1-2-2)
Fujino, Kazushi: 9(1PM1-2-4)
Fujisawa, Masaya: 8(1AM2-3-3), 13(2AM2-1-3)
Fujisawa, Minoru: 8(1AM2-3-4)
Fujita, Tomohiro: 9(1PM1-2-2)
Fukuda, Yuta: 6(1AM1-2-5)
Fukushi, Masahiro: 2(28PM1-2-5)
Fukuta, Kento: 2(28PM2-1-6)
Funabashi, Naoyuki: 13(2AM2-1-4)

G

Geng, Yuting: 4(28PM2-3-5)
Goto, Kana: 14(2AM2-2-5)
Gregory, Clarissa Genevieve: 15(3PM1-2-1)

H

Habuchi, Hiromasa: 11(1PM2-3-2), 11(1PM2-3-3),
11(1PM2-3-5)
Hanada, Masaki: 1(28PM1-1-5)
Hascoet, Tristan: 11(1PM2-2-5)
Hasegawa, Mikio: 1(28PM1-1-4), 8(1AM2-3-4),
10(1PM1-3-3), 10(1PM1-3-4),
10(1PM2-1-3), 13(2AM2-1-1)
Hasegawa, So: 13(2AM2-1-1)
Hatano, Hiroyuki: 12(2AM1-1-4)
Hayamizu, Satoru: 7(1AM2-2-3)
Hinata, Shogo: 9(1PM1-3-2)
Hirano, Kosei: 2(28PM2-1-1)
Ho, Yihsin: 5(28PM3-2-1)
Hojo, Naoki: 16(3PM1-2-4)
Hojo, Masaya: 14(3AM1-2-1)
Honda, Kentaro: 1(28PM1-1-4)
Hosokawa, Yasuteru: 1(28PM1-2-1), 1(28PM1-2-2)
Hwang, Won-Joo: 10(1PM2-1-3)

I

Ichikawa, Haruhisa: 1(28PM1-1-1)

Ichitsuka, Yu: 11(1PM2-3-5)
 Ida, Yuta: 4(28PM3-1-4), 4(28PM3-1-5)
 Ide, Teruji: 4(28PM3-1-3)
 Ikeda, Shion: 5(28PM3-2-3)
 Ikeda, Keisuke: 7(1AM2-2-3)
 Ikeguchi, Tohru: 14(3AM1-1-3)
 Imajyo, Yusuke: 2(28PM1-2-5)
 Inaba, Kensuke: 10(1PM1-3-3)
 Inoue, Kazumasa: 2(28PM1-2-5)
 Iriyama, Taishi: 3(28PM2-2-5), 3(28PM2-2-6),
 14(3AM1-2-3)
 Ishida, Yuki: 8(1AM2-3-5)
 Ishihara, Yuta: 3(28PM2-3-2)
 Ishikawa, Yuki: 5(1AM1-1-1)
 Ishikawa, Junko: 3(28PM2-3-2)
 Ishikawa, Yoshitaka: 12(2AM1-2-3)
 Ishimitsu, Shunsuke: 16(3PM1-2-5)
 Isogai, Ryosuke: 8(1AM2-3-4)
 Itami, Makoto: 4(28PM3-1-2), 13(2AM2-1-2)
 Ito, Mizuki: 11(1PM2-2-4)
 Ito, Chikara: 11(1PM2-2-4)
 Itoh, Yoshitaka: 14(3AM1-1-1), 14(3AM1-1-2)
 Iwai, Kenta: 4(28PM2-3-5)
 Iwami, Takuya: 5(1AM1-1-3), 6(1AM1-1-4)
 Iwamoto, Kazuki: 8(1AM2-3-5)

J

Jin'no, Kenya: 15(3AM1-2-5), 15(3AM1-2-6)

K

Kagawa, Hiroki: 5(1AM1-1-3), 6(1AM1-1-4)
 Kameyama, Yuki: 16(3PM1-2-5)
 Kanagawa, Hiroto: 5(28PM3-2-6)
 Kanemitsu, Hidehiro: 1(28PM1-1-5)
 Kariyama, Hirokazu: 11(1PM2-2-2)
 Kashiara, Yu: 9(1PM1-1-5)
 Katayama, Masaaki: 11(1PM2-3-4)
 Kato, Akinori: 14(3AM1-1-1)
 Kato, Ayumu: 12(2AM1-1-1)
 Kato, Yusuke: 15(3AM1-2-4)
 Kato, Hideyuki: 12(2AM1-2-3)
 Katori, Yuichi: 12(2AM1-2-3)
 Kawaguchi, Shoya: 7(1AM2-2-6)
 Kawakami, Shio: 12(2AM1-1-3)
 Kawakami, Shota: 10(1PM2-1-4)
 Kawakita, Yuusuke: 1(28PM1-1-1), 9(1PM1-2-1)
 Kim, Song-Ju: 8(1AM2-3-4)
 Kimoto, Masanori: 7(1AM2-2-4)
 Kimura, Takayuki: 14(3AM1-1-4)
 Kishimoto, Yui: 10(1PM2-1-1)
 Kitajima, Takahiro: 2(28PM2-1-1), 2(28PM2-1-2),
 4(28PM2-3-6), 5(28PM3-2-5),
 5(28PM3-2-6), 6(1AM1-2-1),

11(1PM2-2-2), 12(2AM1-1-1)
 Kitamura, Daichi: 7(1AM2-2-6)
 Kiya, Hitoshi: 3(28PM2-2-2), 3(28PM2-2-3),
 3(28PM2-2-4)
 Komatsu, Takashi: 4(28PM3-1-2)
 Komiyama, Yutaro: 2(28PM2-1-3), 2(28PM2-1-4),
 7(1AM2-1-2)
 Kondoh, Noriya: 3(28PM2-2-6)
 Konishi, Katsumi: 13(2AM2-2-4)
 Kotaka, Keisuke: 16(3PM1-2-5)
 Kotani, Yukinojo: 2(28PM2-1-6)
 Kozawa, Yusuke: 11(1PM2-3-2), 11(1PM2-3-3),
 11(1PM2-3-5)
 Kubota, Itsuki: 8(1PM1-1-1)
 Kumagawa, Toru: 5(1AM1-1-2)
 Kuramoto, Wataru: 13(2AM2-2-3)
 Kuroda, Sho: 4(28PM3-1-5)
 Kuroda, Kunihiro: 6(1AM1-2-5)
 Kuwahara, Akinobu: 2(28PM2-1-1), 2(28PM2-1-2),
 4(28PM2-3-6), 5(28PM3-2-5),
 5(28PM3-2-6), 6(1AM1-2-1),
 11(1PM2-2-2), 12(2AM1-1-1)

L

Lee, Changseok: 11(1PM2-3-4)
 Leibnitz, Kenji: 1(28PM1-1-4)
 Li, Li: 2(28PM1-2-3), 2(28PM1-2-4),
 14(2AM2-2-5)
 Li, Aohan: 10(1PM1-3-3)
 Lin, Gengtao: 16(3PM1-2-2)
 Lin, Jiaying: 10(1PM2-1-3)
 Luo, Weisen: 6(1AM2-1-1)
 Luo, Zijie: 13(2AM2-2-3)

M

Maeda, Akinori: 7(1AM2-2-1)
 Maeda, Yuka: 8(1AM2-3-1)
 Maeda, Yoshihiro: 1(28PM1-1-4)
 Makino, Shoji: 2(28PM1-2-3), 2(28PM1-2-4),
 4(28PM2-3-3), 14(2AM2-2-5)
 Maruyama, Mayuko: 9(1PM1-2-5)
 Masaki, Hideya: 9(1PM1-3-1)
 Masuda, Hidenobu: 11(1PM2-2-4)
 Masuda, Kohta: 7(1AM2-2-2)
 Masumoto, Ryota: 2(28PM2-1-5)
 Matsubara, Yuki: 5(1AM1-1-1)
 Matsubara, Takashi: 8(1PM1-1-2), 9(1PM1-1-5),
 10(1PM2-1-2)
 Matsui, Yota: 6(1AM2-1-1)
 Matsumoto, Takahiro: 4(28PM3-1-5)
 Matsuo, Yuki: 1(28PM1-1-2)
 Matsuura, Takafumi: 12(2AM1-1-2), 14(3AM1-1-4)
 Matui, Yota: 5(1AM1-1-3)

Matumoto, Takahiro: 4(28PM3-1-4)
 MaungMaung, AprilPyone: 3(28PM2-2-4)
 Mitsu, Takeshi: 8(1AM2-3-5)
 Mitsugi, Jin: 9(1PM1-2-1)
 Mitsukura, Yasue: 15(3PM1-2-1), 16(3PM1-2-2)
 Mitsushima, Dai: 3(28PM2-3-2)
 Miyata, Masahiro: 9(1PM1-2-5)
 Mizutani, Koichi: 8(1AM2-3-1), 8(1AM2-3-2)
 Mori, Shintaro: 4(28PM3-1-6)
 Mori, Kazuo: 12(2AM1-1-4)
 Morisawa, Masayuki: 3(28PM2-3-1), 5(28PM3-2-3)
 Murai, Hiroshi: 3(28PM2-3-2)

N

Nagamori, Teru: 3(28PM2-2-2)
 Nagazawa, Ryuji: 10(1PM2-1-3)
 Naila, Chedlia Ben: 11(1PM2-3-4)
 Nakagawa, Seiji: 16(3PM1-2-4)
 Nakagawa, Yuto: 1(28PM1-1-5)
 Nakamura, Keisuke: 6(1AM1-2-3)
 Nakamura, Akira: 4(28PM3-1-2), 13(2AM2-1-2)
 Nakamura, Takuya: 12(2AM1-2-1)
 Nakano, Takayuki: 6(1AM1-2-3), 9(1PM1-2-3)
 Nakano, Kojiro: 4(28PM3-1-4)
 Nguyen, Kien: 1(28PM1-1-3), 2(28PM2-1-3),
 2(28PM2-1-4), 7(1AM2-1-2),
 9(1PM1-3-1), 10(1PM2-1-3)
 Nguyen, Nguyen Thao: 1(28PM1-2-1)
 Nguyen, Bao Duong Gia: 1(28PM1-2-2)
 Nishida, Masafumi: 4(28PM2-3-4), 7(1AM2-2-2)
 Nishimura, Masafumi: 4(28PM2-3-4), 6(1AM1-2-3),
 7(1AM2-2-1), 7(1AM2-2-2), 9(1PM1-2-3)
 Nishimura, Hiromitsu: 9(1PM1-2-1)
 Nishio, Yoshifumi: 2(28PM2-1-6), 5(1AM1-1-1),
 5(1AM1-1-2), 7(1AM2-1-3), 7(1AM2-1-4),
 12(2AM1-2-1), 12(2AM1-2-2)
 Nishiura, Takanobu: 4(28PM2-3-5)
 Noda, Aoi: 6(1AM2-1-1)
 Noguchi, Ryota: 7(1AM2-2-5)

O

Ochiai, Yuta: 11(1PM2-3-2), 11(1PM2-3-3)
 Ochiai, Hatsune: 4(28PM3-1-1)
 Odagiri, Kazuki: 15(3PM1-1-2)
 Ogata, Jun: 7(1AM2-2-2)
 Ogawa, Daisuke: 11(1PM2-3-2), 11(1PM2-3-3)
 Ogino, Atsushi: 5(28PM3-2-2)
 Ogura, Masaki: 8(1PM1-1-3)
 Ohshita, Keito: 2(28PM2-1-5)
 Okada, Hiraku: 11(1PM2-3-4)
 Okamoto, Saki: 15(3AM1-2-6)
 Okamura, Ryusei: 15(3PM1-1-2)
 Oki, Haruto: 6(1AM1-2-2)

Okuda, Masato: 14(3AM1-2-1)
 Okura, Shunsuke: 6(1AM1-2-2), 14(3AM1-2-2)
 Omori, Takashi: 9(1PM1-2-5)
 Osada, Takuma: 10(1PM1-3-4)
 Osawa, Makoto: 8(1AM2-3-3)
 OTA, Shion: 15(3PM1-1-5)
 Otake, Tsuyoshi: 3(28PM2-2-5), 14(3AM1-2-3)
 Otake, Tsuyosi: 3(28PM2-2-6)
 Otsuka, Teppei: 10(1PM1-3-3)
 Oyama, Tatsuya: 14(3AM1-2-2)
 Oyama, Kan: 15(3PM1-1-4)

P

Park, Jonggeol: 3(28PM2-2-1)
 Pauzi, Mohd Azam Bin Mohd: 2(28PM1-2-5)
 Peper, Ferdinand: 1(28PM1-1-4)

Q

Qi, Zheng: 3(28PM2-2-4)
 Qin, Mohan: 2(28PM1-2-4)

S

Sakama, Minoru: 2(28PM1-2-5)
 Sakohira, Haruka: 7(1AM2-1-3)
 Sanada, Kosuke: 12(2AM1-1-4)
 Sasaki, Tyohei: 13(2AM2-2-4)
 Sato, Junya: 11(1PM2-2-3), 11(1PM2-2-4)
 Sato, Masatoshi: 3(28PM2-2-5), 3(28PM2-2-6),
 14(3AM1-2-3)
 Sato, Hiroyuki: 9(1PM1-2-4), 12(2AM1-1-3),
 12(2AM1-2-4)
 Sato, Yuji: 8(1AM2-3-1)
 Sato, Tadatomo: 4(28PM3-1-3)
 Sawanobori, Yujiro: 3(28PM2-3-1)
 Sekiguchi, Masashi: 4(28PM3-1-2)
 Sekiya, Hiroo: 1(28PM1-1-3), 2(28PM2-1-3),
 2(28PM2-1-4), 7(1AM2-1-2),
 9(1PM1-3-1), 10(1PM2-1-3)
 Shibata, Kenichi: 15(3PM1-1-1)
 Shibata, Ryo: 10(1PM1-3-5)
 Shida, Shuya: 16(3PM1-2-3)
 Shimamura, Tetsuya: 7(1AM2-2-5), 10(1PM2-2-1),
 13(2AM2-1-4)
 Shimazaki, Jun: 4(28PM2-3-6)
 Shimizu, Ryosuke: 12(2AM1-2-1), 12(2AM1-2-2)
 Shimizu, Yuto: 9(1PM1-2-3)
 Shimono, Masanori: 8(1PM1-1-3)
 Shimura, Takumi: 15(3PM1-1-3)
 Shinkawa, Takumi: 12(2AM1-2-3)
 Shiokawa, Shigeki: 9(1PM1-3-2)
 Shiono, Yuki: 6(1AM1-2-3), 9(1PM1-2-3)
 Shiotsuka, Kohei: 1(28PM1-1-4)

Shiozawa, Hidekazu: 15(3PM1-1-3), 15(3PM1-1-4)
 Shirasawa, Reiki: 6(1AM1-2-3), 9(1PM1-2-3)
 Shoji, Yozo: 13(2AM2-1-1)
 Su, Yue: 1(28PM1-1-3)
 Sudo, Ichiro: 11(1PM2-2-3)
 Sudo, Yasuhiro: 15(3PM1-1-2)
 Suga, Norisato: 8(1AM2-3-3), 13(2AM2-1-3)
 Sugimoto, Takanari: 13(2AM2-2-1)
 Sugiura, Yosuke: 7(1AM2-2-5), 10(1PM2-2-1),
 13(2AM2-1-4)
 Sumi, Takuma: 12(2AM1-2-3)
 Suzuki, Tomoya: 13(2AM2-2-1), 13(2AM2-2-2),
 13(2AM2-2-3)
 Suzuki, Masahiro: 6(1AM1-2-4)
 Suzuki, Yutaka: 3(28PM2-3-1), 5(28PM3-2-3),
 16(3PM1-2-3)
 Suzuki, Hiroshi: 2(28PM2-1-1), 2(28PM2-1-2),
 4(28PM2-3-6), 5(28PM3-2-5),
 5(28PM3-2-6), 6(1AM1-2-1),
 11(1PM2-2-2), 12(2AM1-1-1)
 Suzuki, Shuto: 11(1PM2-2-3)
 Suzuki, Ryoya: 11(1PM2-2-3)
 Suzuki, Haruto: 8(1PM1-1-4)

T

Takada, Kazuki: 8(1AM2-3-5)
 Takada, Yutaro: 15(3PM1-1-2)
 Takadama, Keiki: 9(1PM1-2-4), 12(2AM1-1-3),
 12(2AM1-2-4)
 Takahashi, Chisato: 15(3AM1-2-5)
 Takane, Kota: 5(28PM3-2-3)
 Takashi, Takashi: 4(28PM2-3-4)
 Takashima, Ryoichi: 11(1PM2-2-5), 16(3PM1-2-4)
 Takata, Shinjiro: 2(28PM2-1-1)
 Takesue, Hiroki: 10(1PM1-3-3)
 Takie, Shuntaro: 10(1PM1-3-5)
 Takiguchi, Tetsuya: 11(1PM2-2-5), 16(3PM1-2-4)
 Tamura, Satoshi: 7(1AM2-2-3), 15(3AM1-2-4)
 Tanaka, Masahiro: 5(28PM3-2-2)
 Tanaka, Riku: 13(2AM2-2-2)
 Tanaka, Hiroshi: 9(1PM1-2-1), 15(3PM1-1-2)
 Tanaka, Yoko: 13(2AM2-1-2)
 Tanaka, Shoichiro: 12(2AM1-1-3)
 Tanaka, Takafumi: 4(28PM3-1-1), 15(3PM1-1-3)
 Tanaka, Ryosuke: 7(1AM2-2-3)
 Tang, Zhengqiang: 11(1PM2-3-1)
 Terada, Nobuyuki: 16(3PM1-2-3)
 Tobe, Yoshito: 1(28PM1-1-1)
 Tomida, Yuta: 12(2AM1-1-4)
 Tomiya, Ryuichi: 11(1PM2-2-5)
 Toneyawa, Ryosuke: 10(1PM2-2-1)
 Tooyama, Riku: 5(28PM3-2-4)
 Torii, Hideyuki: 6(1AM1-2-4)
 Torikai, Hiroyuki: 8(1PM1-1-1), 8(1PM1-1-4),
 10(1PM2-1-1), 10(1PM2-1-3)

Tsubone, Tadashi: 5(28PM3-2-4)
 Tsuchihashi, Ai: 3(28PM2-2-5)
 Tsuchiya, Yoshihiko: 8(1AM2-3-3), 13(2AM2-1-3)
 Tsukamoto, Yota: 14(3AM1-1-3)
 Tsumori, Shunsuke: 4(28PM3-1-5)
 Tsushima, Honami: 14(3AM1-1-3)

U

Ueda, Tetsuya: 4(28PM2-3-3), 14(2AM2-2-5)
 Uehira, Kazutake: 6(1AM1-2-4)
 Umemoto, Takuto: 2(28PM1-2-5)
 Umemura, Kosei: 11(1PM2-2-4)
 Uruma, Kazunori: 13(2AM2-1-3)
 Uwate, Yoko: 2(28PM2-1-6), 5(1AM1-1-1),
 7(1AM2-1-3), 7(1AM2-1-4),
 12(2AM1-2-1), 12(2AM1-2-2)
 Uwte, Yoko: 5(1AM1-1-2)

W

Wada, Takumi: 1(28PM1-1-1)
 Wada, Masahiro: 1(28PM1-1-2)
 Wada, Tadahiyo: 11(1PM2-3-4)
 Wakamiya, Naoki: 1(28PM1-1-4), 8(1PM1-1-3),
 10(1PM2-1-4)
 Wakao, Tsukasa: 9(1PM1-2-1)
 Wakatsuki, Naoto: 8(1AM2-3-1), 8(1AM2-3-2)
 Waki, Takuya: 8(1AM2-3-2)
 Wang, Jiachen: 2(28PM1-2-3)
 Watanabe, Yuuki: 9(1PM1-2-2)
 Wei, Xiuqin: 6(1AM1-1-4), 6(1AM2-1-1),
 7(1AM2-1-2)

X

Xie, Yinchen: 2(28PM2-1-4)
 Xiuqin, Wei: 5(1AM1-1-3)

Y

Yaguchi, Takaharu: 10(1PM2-1-2)
 Yamada, Tetsuji: 9(1PM1-2-5)
 Yamada, Takeshi: 14(2AM2-2-5)
 Yamada, Yuto: 2(28PM2-1-2)
 Yamaguchi, Kazuho: 7(1AM2-2-4)
 Yamamoto, Yoshitaka: 6(1AM1-2-3), 9(1PM1-2-3)
 Yamamoto, Daisuke: 13(2AM2-1-1)
 Yamamoto, Hideaki: 12(2AM1-2-3)
 Yamamura, Yuto: 16(3PM1-2-3)
 Yamashita, Kiichi: 7(1AM2-1-3)
 Yamashita, Sonoka: 5(28PM3-2-5)
 Yamashita, Junya: 7(1AM2-2-3)
 Yamauchi, Masayuki: 2(28PM2-1-5)

Yamawaki, Kyosuke: 11(1PM2-2-3)
Yano, Hajime: 16(3PM1-2-4)
Yashima, Hiroyuki: 10(1PM1-3-5)
Yasuda, Hiroyuki: 8(1AM2-3-4), 10(1PM1-3-4)
Yasui, Nozomiko: 7(1AM2-2-5), 10(1PM2-2-1),
13(2AM2-1-4)
Yasuno, Takashi: 2(28PM2-1-1), 2(28PM2-1-2),
4(28PM2-3-6), 5(28PM3-2-5),
5(28PM3-2-6), 6(1AM1-2-1),
11(1PM2-2-2), 12(2AM1-1-1)
Yendo, Tomohiro: 11(1PM2-3-1)
Yokogawa, Shinji: 1(28PM1-1-1)
Yoshida, Kota: 6(1AM1-2-2), 6(1AM1-2-5),
14(3AM1-2-1), 14(3AM1-2-2)
Yoshida, Yoshifumi: 8(1AM2-3-4)
Yoshida, Takahito: 10(1PM2-1-2)
Yuan, Sihan: 4(28PM2-3-3)

Z

Zempo, Keiichi: 8(1AM2-3-2)
Zhang, JiuYun: 3(28PM2-2-1)
Zhu, Wenqi: 2(28PM2-1-3), 2(28PM2-1-4),
7(1AM2-1-2)