IWACIII2023
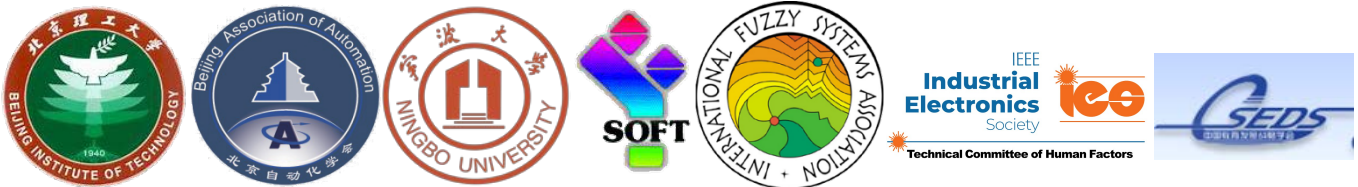
The 8th International Workshop on Advanced Computational Intelligence and Intelligent Informatics

Nov.3-Nov.6, 2023, Beijing, China

PROGRAMME

Organizers & Co-organizers:

Co-sponsors:

Welcome to IWACIII 2023

The 8th International Workshop on Advanced Computational Intelligence and Intelligent Informatics (IWACIII 2023) will be held from Nov. 3 to Nov. 6, 2023 in Beijing, China. On behalf of the organizing committee of IWACIII, we would like to express our warmest welcome to all participants.

During the past years, supported by the researchers and scientists all over the world, IWACIII has been actively developing their domestic and international scientific and technical exchanges, which is influential and considerable especially in the Asia area.

Due to the past COVID-19 pandemic, the last workshop was organized mainly online. Now, we have overcome all the difficulties and we miss you all! It is time for us to get together at IWACIII 2023. With the great support of many researchers and scholars, and Springer, the world-leading academic publisher, IWACIII 2023 continuously contributes to the development of advanced computational intelligence and information technology as well as their various applications. It has no suspicion that the exchanges about Computational Intelligence, Information Technology, and their applications are quite favorable not only for the Universities but also for the close relationship between Industry and Academy.

Dear Friends, IWACIII 2023 closely relies on your support, while the development of Computational Intelligence also ties up our participation. IWACIII 2023 is an important occasion that could give a general comment of the recent years' global science and technology, and we can also expect to see that IWACIII 2023 will indicate us the future development directions. May we join together to contribute more to develop Computational Intelligence, Information Technology and their applications, to advance both the theory and application for endeavor to create the brilliant future.

Thanks again for your attendance to IWACIII 2023.

From

Kaoru Hirota
Founding Chair

Dawei Shi

Xiangyuan Zeng
Organized Session Chairs

Shinichi Yoshida

Huifang Li
Publication Chair

Yuan Li
Local Affairs

Rongli Li
Secretary

and all other organizing committee members.

Greetings from General Chairs

Hongbin Ma   Jinhua She

We would like to thank the honorary chair, Prof. Kaoru Hirota, for his continuous great support of BIT to organize the workshop. On behalf of the Beijing Institute of Technology and Beijing Association of Automation, it is our great pleasure to welcome you to the 8th International Workshop on Advanced Computational Intelligence and Intelligent Informatics (IWACIII 2023) which will be held from Nov. 3 to Nov. 6, 2023 in Beijing, China.

The highlights of IWACIII 2023 include 6 keynotes by oversea top-notch researchers – Jianwei Zhang, Hiroshi Nakajima, Takeshi Ikenaga, Zhengtao Ding, Minyi Huang, and Chenguang Yang; 4 keynotes by Chinese top-notch researchers – Long Wang, Honghai Liu, Ke Tang, and Yong Wang; and about 30 sessions on different aspects of computational intelligence, intelligent informatics and their applications. And we also invite three famous Chinese professors, Fuchun Sun, Ran Tao, and Xingguang Duan to share their insights on computational intelligence and industry application in our special sesson on AI industrialization.

Apart from the technical programs, participants are also cordially invited to attend various social events, such as welcome reception, banquet, round table discussion, etc. As the workshop will be held at the beginning of November, the weather in the duration will be very nice and you can enjoy beautiful scenes of Beijing comfortably.

We sincerely thank all keynote speakers, the authors, reviewers, members of the organizing committee, and volunteers for your great support of IWACIII 2023. Wish every participant enjoy a lot from IWACIII 2023.

Greetings from Advisory Board

Yaping Dai   Toshio Fukuda

The great success of IWACIII has been witnessed by the previous seven times of successful holding. IWACIII provides a very good opportunity to exchange ideas among researchers and scholars who are dedicated to computational intelligence, intelligent informatics and their applications. They are getting more and more influential and considerable especially in the Asia area.

We believe that this time, the 8th IWACIII, with the great effort of the organizing committee and the contribution of all authors and presenters, would be an excellent occasion for exchanging academic ideas and developing and promoting friendships. Thank you for your contribution to IWACIII 2023. We hope that IWACIII 2023 would be a wonderful memory to you.

Greetings from Beijing Association of Automation

Qunxiong Zhu   Yuan Xu

On behalf of Beijing Association of Automation, we are pleased to organize the 8th International Workshop on Advanced Computational Intelligence and Intelligent Informatics (IWACIII 2023) with Beijing Institute of Technology. We need to express our sincere welcome to all attendees of IWACIII2023 and we hope our collaboration can make you enjoy a pleasant trip to Beijing.

First of all, we would like to express our sincere gratitude to everyone who made contributions and various support to this workshop, especially the team of BIT who has done hard work which makes this great event possible. We would provide our continuous support with the growth of this event as well as the growth of our association.

As co-organizer of this great event, we would also like to thank all sponsors. Your support to this workshop adds the value of this workshop and help to promote this event as a platform for academic exchange.

Besides, we would also like to give our special thanks to Springer Press, which helps to improve the impact of our workshop. And sincere thanks to Fuji Technology Press for their continuous great support to our past conferences.

And we welcome the members of Beijing Association of Automation, for your attendance and continuous support to this workshop.

We hope that this workshop will be successful and fruitful with all your great efforts and time.

Thank you again for your cooperation and participation for IWACIII 2023.

Greetings from Program Committee Chairs

Bin Xin   Naoyuki Kubota

On behalf of the program committee of the 8th International Workshop on Advanced Computational Intelligence and Intelligent Informatics (IWACIII 2023), we would like to express our gratitude to all those who submitted research papers and to volunteer reviewers who took on hard reviewing work for the workshop. Undoubtedly, their great efforts and contributions are critical for the success of the workshop.

We received full submissions from over 50 research institutions. Each submitted paper has been reviewed by at least two reviewers in terms of originality, importance, presentation, English usage, and overall quality. According to suggestions of Springer, the program committee has finally accepted 57 papers from 118 submissions. The Springer press will be in charge of later work of EI indexing. The technical program includes 7 general sessions and 4 organized sessions that cover a broad range of topics related to computational intelligence and intelligent informatics.

We hope that the workshop will provide a great opportunity for exchanging research activities and fostering research collaboration in the future.

Thank you again for your cooperation and participation for IWACIII 2023.

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Lan Cheng	Chunmei Zhang	Zhi Zheng			

Program at a Glance

Nov.3	Registration	No.5 Building, Lobby of Xijiao Hotel Beijing
Nov.4	**Day 1**	
8:30-9:00	Opening Ceremony	No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603
9:00-9:40	Keynote Speech 1 (on site)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Network-Connected Formation and Cooperative Control of Autonomous Systems By Zhengtao Ding (University of Manchester)	
9:40-10:20	Keynote Speech 2 (on site)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Learn to Optimize By Ke Tang (Southern University of Science and Technology)	
10:20-10:30	Group Photo & Tea Break	Gate of No.1 Building&No.5 Building 2nd Floor
10:30-11:20	Keynote Speech 3 (on site)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Explore functional corticomuscular coupled information for medical devices and systems By Honghai Liu (Harbin Institute of Technology, Shenzhen, China)	
11:20-12:00	Keynote Speech 4 (on site)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Intelligent learning and optimization for automotive lightweight design By Yong Wang (Central South University)	
Lunch	Shangyuan Dining Room	No. 5 Building 2nd Floor
13:30-18:00	Special Session on AI Industrialization 　　　　　　　　　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603	
13:50-14:25	Keynote Speech 5 (online)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Kinds of Intelligence By Hiroshi Nakajima (Kyushu Institute of Technology)	
14:25-14:30	Tea Break	No.1&No.5& Building 2nd Floor
14:30-16:00	3 Parallel Sessions: 15 min/each OP, 15 min x 6 (max) = 90 min S1, S2, S3　　　　　　　　　　　No.1 Building, 2nd Floor, No.11/No.12/No.18 Meeting Room	
16:00-18:00	3 Parallel Sessions: 15 min/each OP, 15 min x 8 (max) = 120 min S4, S5, S6　　　　　　　　　　　No.1 Building, 2nd Floor, No.11/No.12/No.18 Meeting Room	
Banquet	Shangyuan Dining Room	No.5 Building, 2nd Floor
Nov.5	**Day 2**	
8:30-9:10	Keynote Speech 6 (on site)　　　　　No.5 Building, 2nd Floor,Jinyuan Hall/Zoom ID: 788 378 7603 Artificial brain-vision computer for creating seamless interactive applications between real and virtual worlds By Takeshi Ikenaga (Waseda University)	
9:10-9:50	Keynote Speech 7 (online)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall//Zoom ID: 788 378 7603 Mean Field Games for engineering By Minyi Huang (Carleton University, Ottawa, Canada)	
9:50-10:00	Tea Break	No.5 Building 2nd Floor
10:00-10:40	Keynote Speech 8 (on site)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Feedback Mechanisms, Aspiration Dynamics, and the New Paradigm of Collective Games By Long Wang (Peking University, China)	
10:40-12:10	2 Parallel Sessions: 15 min/each OP, 15 min x 6 (max) = 90 min S7, S8　　　　　　　　　　　　No.1 Building, 2nd Floor, No.11/No.12 Meeting Room	
Lunch	Shangyuan Dining Room	No.5 Building, 2nd Floor
14:00-14:50	Keynote Speech 9 (online)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Robust robot cognition and control driven by models and crossmodal learning By Jianwei Zhang (University of Hamburg, Germany)	
14:50-15:30	Keynote Speech 10 (online)　　　　　No.5 Building, 2nd Floor, Jinyuan Hall/Zoom ID: 788 378 7603 Human-like Robot Control Design and Manipulation Skill Learning By Chenguang Yang (University of West England)	
15:30-15:40	Tea Break	No.1 Building, 2nd Floor
15:40-17:10	3 Parallel Sessions: 15 min/each OP, 15 min x 6(max) = 90 min S9, S10, S11　　　　　　　　　No.1 Building, 2nd Floor, No.11/No.12/No.18 Meeting Room	
17:10-18:00	**Closing/Award Ceremony**　　　　No.5 Building, 2nd Floor,Jinyuan Hall/Zoom ID: 788 378 7603 17:10-17:30　　AI Contest Show 17:30-18:00　　Conference Summary & Award Ceremony	

Parallel Sessions

Nov. 4

14:30-16:00, Sat., Nov.4　　　　　　　　　　**No.11 Meeting Room/Zoom ID: 453 795 8807**

Co-chairs: *Hiroki Shibata (Tokyo Metropolitan University), Takenori Obo (Tokyo Metropolitan University),*
Eri Sato-Shimokawara (Tokyo Metropolitan University)

14:30-14:45　Research on Estimation of Kyphosis Degree Based on Monocular Camera for Achieving Furniture's Adaptive Height Adjustment

Qingwei Song, Naoyuki Kubota, and Yuqi Zhang

14:45-15:00　Cognitive Impairment Detection System Based on Image Segmentation and Artificial Intelligence Art

Yuqi Zhang, Qingwei Song, Takenori Obo, and Naoyuki Kubota

15:00-15:15　Developing a Searching Sheep Application using Machine Learning

Chengyuan Dong and Yihsin Ho

15:15-15:30　Using Non-Deep Learning to Recognize High and Low Valence Emotions on Young Adults by HRV

Yidi Jing and Eri Sato-Shimokawara

15:30-15:45　Proposal of Timestamp-based Dynamic Context Features for Music Recommendation

Yasufumi Takama, Lin Qian, and Hiroki Shibata

15:45-16:00　Method to Control Embedded Representation of Piece of Music in Playlists

Hiroki Shibata, Kenta Ebine, and Yasufumi Takama

14:30-16:00, Sat., Nov.4　　　　　　　　　　**No.12 Meeting Room/Zoom ID: 851 411 1683**

Co-chairs: *Lan Cheng (Taiyuan University of Technology), Zhi Zheng (Zhejiang University)*

14:30-14:45　Reinforcement Learning-based Policy Selection of Multi-sensor Cyber Physical Systems under DoS Attacks

Zengwang Jin, Qian Li, Huixiang Zhang, and Changyin Sun

14:45-15:00　Design of a Rotating Inverted Pendulum Control System Based on Qube-Servo2

Haoran Wang, Qing Wang, and Yujue Wang

15:00-15:15　Reducing Communication Consumption in Collaborative Visual SLAM with Map Point Selection and Efficient Data Compression

Weiqiang Zhang, Lan Cheng, Xinying Xu, and Zhimin Hu

15:15-15:30　Sequential Masking Imitation Learning for Handling Causal Confusion in Autonomous Driving

Huanghui Zhang and Zhi Zheng

15:30-15:45　Neural Network Control of Distributed Cooperative Formation of Multi-Agent System

Si Kheang Moeurn and Bin Xin

S3: Session: Intelligent Decision-making and Evolutionary Algorithms

14:30-16:00, Sat., Nov.4   **No.18 Meeting Room/Zoom ID: 472 076 4781**

Co-chairs: *Chun Mei Zhang (Taiyuan University of Science and Technology), Bin Xin (Beijing Institute of Technology)*

14:30-14:45   An Improved Hypervolume-based Evolutionary Algorithm for Many-Objective Optimization

Chengxin Wen, Lihua Li, and Hongbin Ma

14:45-15:00   An End-to-End Intent Recognition Method for Combat Drone Swarm

Hui He, Zhihong Peng, Peiqiao Shang, Wenjie Wang, and Xiaoshuai Pei

15:00-15:15   Hybrid D-DEPSO for Multi-Objective Task Assignment in Hospital Inspection

Chun Mei Zhang, Xin Yao Ma, and Bin Zhai

15:15-15:30   Beacon Localization Method Based on Flower Pollination-Fireworks Algorithm

Zhaofeng Du, He Huang, and Bin Xin

15:30-15:45   Stochastic Resource Allocation with Time Windows

Yang Li and Bin Xin

S4: Organized Session: Dynamical/evolutionary game systems based on strategy updating rules or learning algorithms

16:00-18:00, Sat., Nov.4   **No.11 Meeting Room/ Zoom ID: 453 795 8807**

Co-Chairs: *Yifen Mu (Chinese Academy of Sciences), Kaoru Hirota (Beijing Institute of Technology)*

16:00-16:15   Parameter Identification for Fictitious Play Algorithm in Repeated Games

Hongcheng Dong and Yifen Mu

16:15-16:30   Evolution of the dynamical game system driven by the Hedge algorithm and myopic best response

Xinxiang Guo and Yifen Mu

16:30-16:45   An Analysis of the Generalized Tit-for-Tat Strategy within the Framework of Memory-One Strategies

Yunhao Ding, Jianlei Zhang, and Chunyan Zhang

16:45-17:00   A Model for Forest Management Decision

Yutao Qiu

17:00-17:15   Appropriate Deforestation, More Carbon Sequestration

Yifeng Ding

17:15-17:30   Modeling and Simulation of Four-wheel Drive (4WD) Autonomous Vehicle

Zeming Zhao

17:30-17:45   A Review of Control Algorithms for Three-axis Self-stable Pan-tilt of UAV

Zicai Peng

17:45-18:00   Formation control of second-order multi-agent systems with region constraint

Zheng Quan Yang and Leran Ma

16:00-18:00, Sat., Nov.4　　　　　　　　　　　　　**No.12 Meeting Room/Zoom ID: 851 411 1683**

Co-chair: *Shinichi Yoshida (Kochi University of Technology), Kazushi Okamoto (The University of Electro-Communications), Yukinobu Hoshino (Kochi University of Technology)*

16:00-16:15　Keyword-based Research Field Discovery with External Knowledge Aware Hierarchical Co-clustering

Kai Sugahara and Kazushi Okamoto

16:15-16:30　Simulation for development of microcomputer car with white line following controller

Junichi Sasagawa, Michio Watamori, and Yukinobu Hoshino

16:30-16:45　Design and implementation of ANFIS on FPGA and verification with class classification problem

Moegi Utami, Yukinobu Hoshino, and Namal Rathnayake

16:45-17:00　Characteristics Verification of the Luggage Transportation Problem Using Relative Vectors in Multi-agent Reinforcement Learning

Daisuke Hashimoto and Yukinobu Hoshino

17:00-17:15　Validation of Contour Extraction Using YOLACT for Analysis of NK Cell Chemotaxis

Reiji Okawa, Yukinobu Hoshino, Shoya Kusunose, Shinpei Yamamoto, Takashi Ushiwaka, and Nagamasa Maeda

17:15-17:30　Improving the Efficiency of Image Recognition for Yuzu Fruit Counting using Object Recognition Models

Takahiro Sugiyama and Shinichi Yoshida

17:30-17:45　A Study on Explainability of Deep Learning Model for Image Classification Using CycleGAN

Taiga Nakajima and Shinichi Yoshida

S6: Session: Object and Anomaly Detection

16:00-18:00, Sat., Nov.4　　　　　　　　　　　　　**No.18 Meeting Room/Zoom ID: 472 076 4781**

Co-chairs: *Zhentao Liu (China University of Geosciences (Wuhan)), Jia Zhang (Beijing Institute of Technology)*

16:00-16:15　3D Point Cloud-based Lithium Battery Surface Defects Detection Using Region Growing Proposal Approach

Zia Ur Rehman, Xin Wang, Abdulrahman Abdo Ali Alsumeri, Malak Abid Ali Khan, and Hongbin Ma

16:15-16:30　Helmet Detection Algorithm of Electric Bicycle Riders Based on YOLOv5 with CBAM Attention Mechanism Integration

Si-Yue Fu, Dong Wei, and Liu-Ying Zhou

16:30-16:45　Plane Defect Detection Based On 3D Point Cloud

Mingsong Bai, Shuang Wu, Hongbin Ma, and Ying Jin

16:45-17:00　An Attention Detection System Based on Gaze Estimation Using Self-Supervised Learning

Xiang-Yu Zeng, Bo-Yang Zhang, and Zhen-Tao Liu

17:00-17:15　Multi-sensor Data Fusion Algorithm for Indoor Fire Detection Based on Ensemble Learning

Lei Wang and Jia Zhang

Nov. 5

S7: Fault Diagnosis, Analysis and Prediction

10:40-12:10, Sun., Nov.5   **No.11 Meeting Room/ Zoom ID: 453 795 8807**

Co-chairs: *Ming-Qing Zhang (Beijing University of Chemical Technology)*, *Xiaoyan Zhao (University of Science and Technology Beijing)*

10:40-10:55   **Novel Fault Diagnosis Method Integrating D-L2-FDA and AdaBoost**

Yang Zhao, Wei Ke, Wei Zhang, Yi Luo, Qun-Xiong Zhu, Yan-Lin He, Yang Zhang, Ming-Qing Zhang, and Yuan Xu

10:55-11:10   **Structural Health Monitoring of Similar Gantry Crane Based on Federated Learning Algorithm**

Zexuan Peng, Zhaohui Zhang, Xiaoyan Zhao, Tianyao Zhang, and Qi Wu

11:10-11:25   **A Novel SEIAISRD Model to Evaluate Pandemic Spreading**

Hui Wei and Chunyan Zhang

11:25-11:40   **Correlation Analysis Between Insomnia Severity and Depressive Symptoms of College Students Based on Pseudo-siamese Network**

Ya-fei Wang, Yan-ling Zhu, Peng Wu, Meng Liu, and Hui Gao

11:40-11:55   **Construction and Research of Pediatric Pulmonary Disease Diagnosis and Treatment Experience Knowledge Graph Based on Professor Wang Lie's Experience**

Qingyu Xie and Wei Su

11:55-12:10   **Adaptive Design of Uni-variate Alarm Systems Based on Statistical Distance Measures**
Mohsen Asaadi, Koorosh Aslansefat, Iman Izadi, and Fan Yang

S8: Session: Behavior Recognition and Analysis

10:40-12:10, Sun., Nov.5   **No.12 Meeting Room/Zoom ID: 851 411 1683**

Co-chairs: *Kazuhiko Kawamoto (Chiba University), Dong Wei (Beijing University of Civil Engineering and Architecture)*

10:40-10:55   **Zero-Shot Action Recognition with ChatGPT-based Instruction**

Nan Wu, Hiroshi Kera, and Kazuhiko Kawamoto

10:55-11:10   **Algorithm for Human Abnormal Behavior Recognition Based on Improved Spatial Temporal Graph Convolutional Networks**

Qi Wu, Xiaoyan Zhao, Zhaohui Zhang, Tianyao Zhang, and Zexuan Peng

11:10-11:25   **Research on Algorithms of Lateral Face Recognition Based on Data Generation**

Zimin Zhang, Zhaohui Zhang, Xiaoyan Zhao, and Tianyao Zhang

11:25-11:40   **A System for Estimating the Importance of Speech Based on Acoustic Features**

Jiating Liu and Sumio Ohno

11:40-11:55   **Effects of Pseudo Labels in Pose Estimation Models Using Semi-supervised Learning**

Harunobu Ariga and Yuki Shinomiya

S9: Advanced Modeling and Control

15:40-17:10, Sun., Nov.5   **No.11 Meeting Room/Zoom ID:453 795 8807**

Co-chairs: *Xiaojun Sun (Xiaojun Sun), Hongbin Ma (Beijing Institute of Technology)*

15:40-15:55   Design and Operation Control of an Indoor Storage Crane

Rahman Mizanur, Yiming Duan, Malak Abid Ali Khan, Zia Ur Rehman, and Hongbin Ma

15:55-16:10   Design of Intelligent Twin-Screw Extruder Control System Based on Improved PSO-BP Neural Network

Xuanhao Yang, Hongzhan Zhang, and Wei Xiao

16:10-16:25   Finite-time Stabilization-based Neural Control for the Synchronous Generator

Honghong Wang, Bing Chen, Chong Lin, and Gang Xu

16:25-16:40   A Constant Air Flow Controller Based on Interval Type-2 Fuzzy PID Controller

Bojin Shang, Xiaohan Wang, Shuai Shao, and Yaping Dai

16:40-16:55   Accelerated Lifetime Experiment of Maximum Current Ratio Based on Charge and Discharge Capacity Confinement

Baoji Wang, Boyan Li, Qixuan Wang, and Lei Dong

16:55-17:10   Optimal Information Fusion Descriptor Fractional Order Kalman Filter

Xiao Liang, Guangming Yan, Yanfeng Zhu, Tianyi Li, and Xiaojun Sun

S10: Unmanned Systems and Robotics

15:40-17:10, Sun., Nov.5   **No.12 Meeting Room/Zoom ID: 851 411 1683**

Co-Chairs: *Jinhua She (Tokyo University of Technology), Yongming Han (Beijing University of Chemical Technology)*

15:40-15:55   Dual-loop Control Based on Tube-based MPC for UAVs with Disturbance

Bowen Hong, Zhiwei Chen, Yongming Han, and Zhiqiang Geng

15:55-16:10   A UAV Penetration Method Based on the Improved A* Algorithm

Shitong Zhang, Qing Wang, Bin Xin, and Yujue Wang

16:10-16:25   Moving-Target Enclosing Control for Multiple Nonholonomic Mobile Agents Under Input Disturbances

Yaning Jin, Shuang Ju, and Jing Wang

16:25-16:40   Motion Capture Modeling of Dexterous Hand for Intelligent Sensing

Xiaoyan Zhao, Siyi Cui, Zhaohui Zhang, Qi Cao, Yuan Yuan, Xianhao Wu, and Shaowen Zheng

16:40-16:55   Design of a Left-right-independent Pedaling Machine for Lower-limb Rehabilitation

Shigeki Kuroda, Jinhua She, Rennong Wang, Daisuke Chugo, Keio Ishiguro, Hiromi Sakai, and Hiroshi Hashimoto

Co-chairs: *Kewei Chen (Ningbo University), Yuan Li (Beijing Institute of Technology)*

15:40-15:55   Research on Water Surface Environment Perception Method Based on Visual and Positional Information Fusion

Qin Na, Zhe Zuo, Ning Xu, Zhen Yu Zhang, and Yi Lu

15:55-16:10   Pipe Alignment With the Image Based Visual Servo Control

Ivan Kholodilin, Nikita Savosteenko, Nikita Maksimov, Dmitry Khriukin, and Maksim Grigorev

16:10-16:25   An Improved TrICP Point Cloud Registration Method Based on Automatically Trimming Overlap Regions

Pengcheng Jiang and Yuan Li

16:25-16:40   Exploring whether CNN-based segmentation models should extract features in earlier or later stages for MRI images

Hibiki Umeda and Yuki Shinomiya

16:40-16:55   FFD-SLAM Algorithm for Fusion Object Detection and Optical Flow Filtering in Dynamic Scenes

Hao Zhang, Tianjie Zhong, Fangyan Dong, and Kewei Chen

Conference Venue

IWACIII2023 will be held at 西郊宾馆/ Xijiao Hotel Beijing, as well as Zoom online meeting. The address of the conference venue is 北京市海淀区王庄路 18 号 /No.18 Wangzhuang Road, Haidian District, Beijing 100000 China.

Our conference venue includes a Report Hall in Building No. 5, 2nd floor, which named 金缘厅 and 3 Parallel meeting rooms in Building No.1, 2nd floor, which are No.11、No.12、and No.18 meeting room.

⭐ **Location of Hotel Buildings**
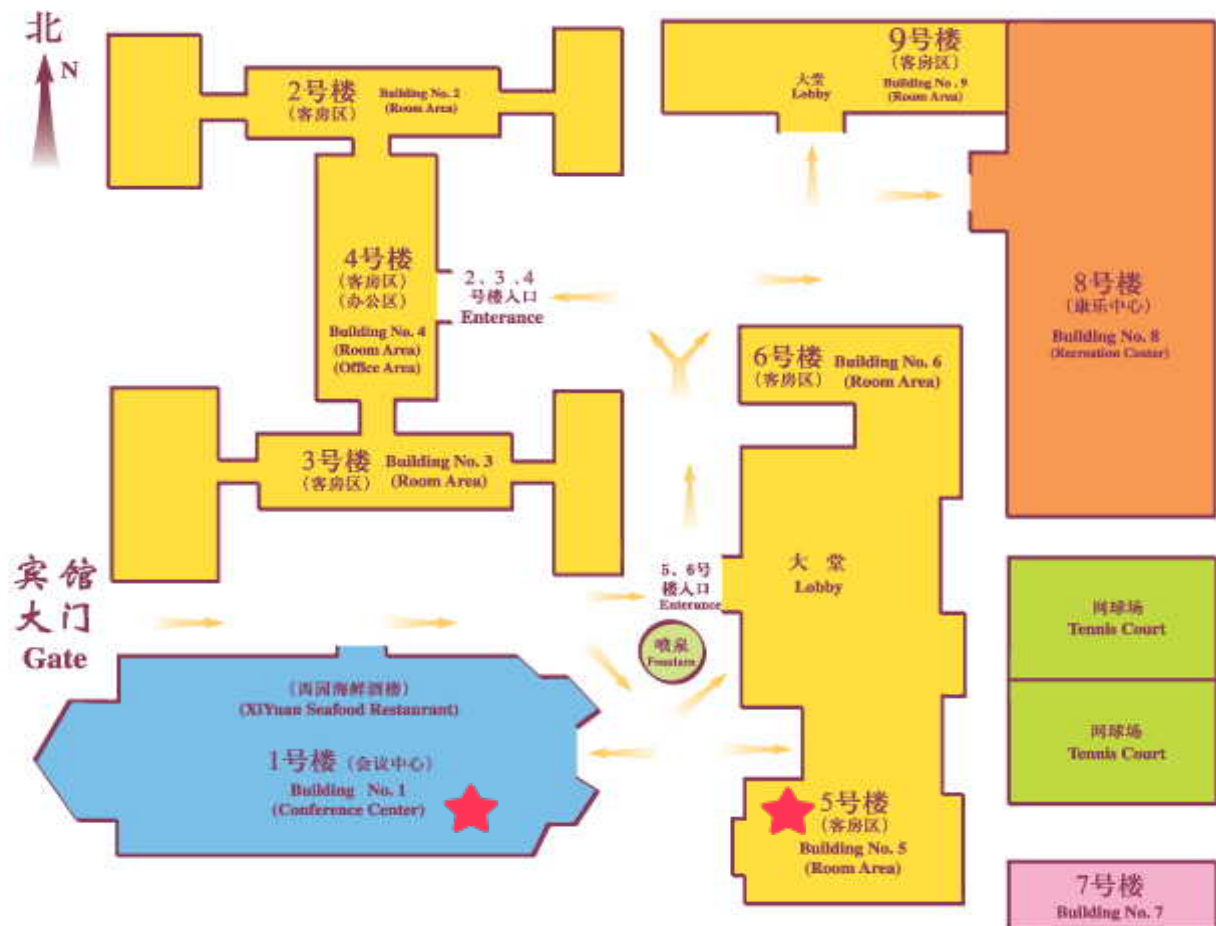
There shows only the guideline photo of Building No.1.

For Building No.5, 2nd floor, you are suggested to follow the guidelines on site to get to Jinyuan Hall.

Building No.1, 2nd Floor
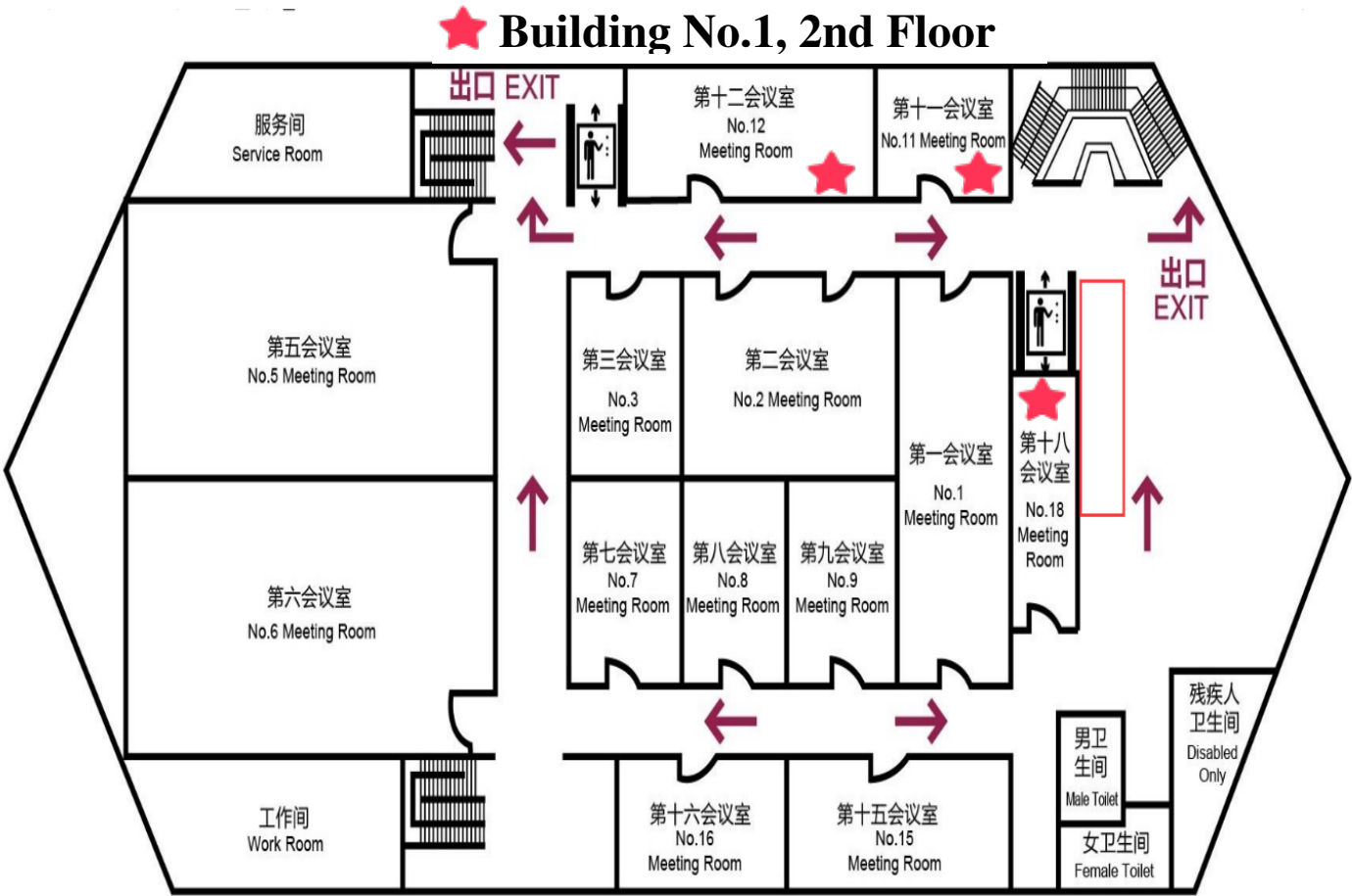
Zoom

For Online Participants, Zoom Online Information is as follows：

Tips: If you meet a 13215 problem code when joining in Zoom meeting, please login your Zoom ID and try again. If you don't have a Zoom ID, please contact us immediately.　　　(Email address:iwaciii@163.com)

Jinyuan Hall:

link：**https://zoom.us/j/7883787603?pwd=RFFpTWZDVnE3ZjN3eGRLcFdibk1MUT09**
Room ID: 788 378 7603
Password: iwaciii

No.11 Meeting Room：

Link：**https://zoom.us/j/4537958807?pwd=enFUY1VLZDFhMDF2SkZKUnV5djErQT09**
会议号: 453 795 8807
密码: iwaciii

No.12 Meeting Room：

Link：**https://zoom.us/j/8514111683?pwd=VjBISmhOVEtDZjdIVjFvR056N2NPdz09**
会议号: 851 411 1683
密码: iwaciii

No.18 Meeting Room：

Link：**https://zoom.us/j/4720764781?pwd=V2RQcDBsZ1V5Nmx3aEZRRytzd2hNQT09**
**会议号: 472 076 4781**
密码: iwaciii

How to get to 西郊宾馆/Xijiao Hotel Beijing

Subway stations besides 西郊宾馆/ Xijiao Hotel Beijing are 地铁 **13** 号的五道口地铁站和 **15** 号线的清华东路西口地铁站

from Terminal 3 of Beijing Capital International Airport：

take Beijing Subway Capital Airport Express**（北新桥** direction），change to Line 10（**太阳宫** direction） at **三元桥** station，change to Line 13（**东直门** direction）at **知春路** station，get off the subway at **五道口** station. **from 五道口 station，** take a taxi or walk on foot (nearly 842 metres).
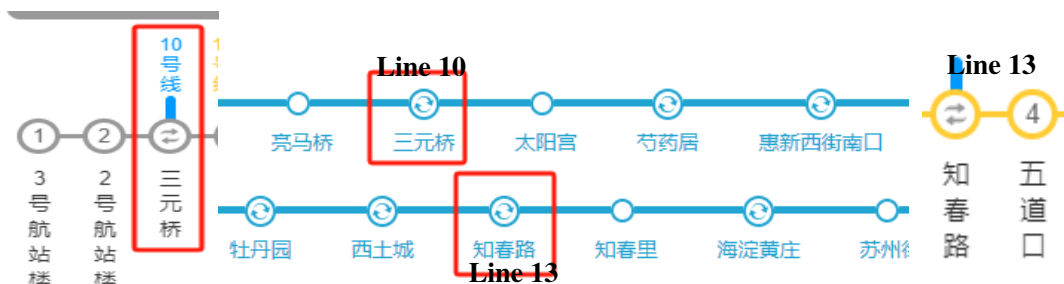
Keynote Speech 1 (on site):

Prof. Zhengtao Ding (University of Manchester, UK)

Title: Network-Connected Formation and Cooperative Control of Autonomous Systems

Abstract: In this network-connected world, many tasks require coordination and cooperation of subsystems/agents via network connection. Multi-agent systems are good examples of interplay between network communication and control applications. This talk will briefly review some fundamental concepts of multi-agent systems and important developments in consensus control, distributed optimization, and their applications in robotics and power and energy systems. It will then focus on formation and cooperative control mobile robots and autonomous vehicles. In particular, the talk will cover in details of some important methods, such as affine and bearing-only formation control algorithms which rely on the stress matrices and bearing. It will also cover distributed motion control algorithms to ensure autonomous overtaking of autonomous vehicles in a dynamic environment using the Artificial Potential Field (APF) method based on a robust autonomous vehicle platoon system.

Bio: Zhengtao Ding received B.Eng. degree from Tsinghua University, Beijing, China, and M.Sc. degree in systems and control, and the Ph.D. degree in control systems from the University of Manchester Institute of Science and Technology, Manchester, U.K. After working in Singapore for ten years, he joined the University of Manchester in 2003, where he is currently the Professor of Control Systems and the Head of Control, Robotics and Communication Division. He has authored/co-authored three books, including the book Nonlinear and Adaptive Control Systems (IET, 2013) and has published over 300 research articles. His research interests include nonlinear and adaptive control theory and their applications, more recently network-based control, distributed optimization and distributed learning, with applications to power systems and robotics. Prof. Ding serves/has served as the Editor in Chief of Drones and Autonomous Vehicles, Subject Chef Editor of Nonlinear Control for Frontiers, and Associate Editor for Scientific Reports, IEEE Transactions on Automatic Control, IEEE Transactions on Circuit and Systems II, IEEE Control Systems Letters, Transactions of the Institute of Measurement and Control, Control Theory and Technology, Unmanned Systems and several other journals. He is a member of IEEE Technical Committee on Nonlinear Systems and Control, IEEE Technical Committee on Intelligent Control, and IFAC Technical Committee on Adaptive and Learning Systems. He is a fellow of The Alan Turing Institute, the UK's national institute for data science and artificial intelligence.

Keynote Speech 2 (on site)

Prof. Ke Tang (Southern University of Science and Technology, China)

Title：Learn to Optimize

Abstract: Real-world optimization problems are becoming increasingly complex such that off-the-shelf algorithms could hardly offer satisfactory performance. On the other hand, the prior knowledge and efforts to manually design a new dedicated algorithm may, in many cases, unaffordable. It is thus natural to ask whether it is possible to automate the algorithm design to some extent. This talk tries to provide some preliminary answers to this question. We will start with an introduction to the concept of Learn to Optimize (L2O), i.e., a data-driven paradigm for automated algorithm/solver design. Building blocks and recent progresses of L2O will then be elaborated. Successful case studies and future directions will also be presented.

Bio: Ke Tang is a Professor at the Department of Computer Science and Engineering, Southern University of Science and Technology (SUSTech), and a Fellow of IEEE. Before joining SUSTech in January 2018, he was with the School of Computer Science and Technology, University of Science and Technology of China (USTC), first as an Associate Professor (2007-2011) and then as a Professor (2011-2017). His major research interests include evolutionary computation and machine learning, as well as their applications. He has published more than 200 papers, which have received over 13000 Google Scholar citations. He received the IEEE Computational Intelligence Society Outstanding Early Career Award and the Natural Science Award of Ministry of Education (MOE) of China, and was awarded the Newton Advanced Fellowship (Royal Society) and the Changjiang Professorship (MOE of China). He is an Associate Editor of the IEEE Transactions on Evolutionary Computation and served as a member of Editorial Boards for a few other journals.

Keynote Speech 3 (on site)

Prof. Honghai Liu   (Harbin Institute of Technology, Shenzhen, China)

Title: Explore functional corticomuscular coupled information for medical devices and systems

Abstract: Functional corticomuscular coupled information plays a crucial role in human motion science and applications that requires joint multidisciplinary efforts such as brain science and rehabilitation. This talk attempts to present the past, current and future of funcaitonal corticomuscular information interaction and its role in human centred medical systems. One of the problems is that majority of motor performance is assessed by subjective qualitative assessments based on individual movement protocols. It is evident that there is no unified standardized motor function metrics technology, restricting a wide spectrum of applicatons such as stroke rehabilitation. This talk presents the reseach outcomes of the lab led by the speaker with a goal of developing a metric framework to measure brain-body interaction information. The talk is concluded with research directions and open discussions.

Bio: Honghai Liu received his Ph.D from King's College, University London, UK. He is a Chair Professor at Haribin Institue of Technology, Shenzhen, China. He previously held research appointments at King's College London, University of Aberdeen, University of Portsmouth and project leader appointments in large-scale industrial control and system integration industry. He is interested in sensing and understanding for medical systems and applications with an emphasis on approaches that could make contribution to the intelligent connection of perception to action using contextual information. He has authored/co-authored more than 200 per-reviewed journals and conference papers. He is Member of Europe Academy of Sciences, IEEE Fellow .

Keynote Speech 4 (on site)

Prof. Yong Wang (Central South University, China)

Title: Intelligent learning and optimization for automotive lightweight design

Abstract: In automotive lightweight design, we always face different kinds of optimization problems, which exhibit very complex characteristics, such as expensive, black-box, multiple objectives, multiple constraints, mixed variables, and discontinuous objective functions. Among these complex characteristics, expensive and black-box are the most common. In order to deal with expensive optimization problems, we need to cheap establish surrogate models based on intelligent learning techniques. In addition, we also need intelligent optimization techniques to deal with black-box optimization problems. Moreover, other complex characteristics pose their corresponding challenges to intelligent learning and optimization. In this talk, I will introduce how to design intelligent learning and optimization techniques to deal with different kinds of expensive and black-box optimization problems and their applications in automotive lightweight design.

Bio: Yong Wang received the Ph.D. degree in control science and engineering from the Central South University, Changsha, China, in 2011. He is a Professor with the School of Automation, Central South University, Changsha, China. His current research interests include intelligent learning and optimization and their interdisciplinary applications. Dr. Wang is an Associate Editor of IEEE Transactions on Evolutionary Computation and Swarm and Evolutionary Computation. He was a recipient of Cheung Kong Young Scholar by the Ministry of Education, China, in 2018, a Web of Science highly cited researcher in Computer Science in 2017 and 2018, and an Elsevier's Chinese Most Cited Researcher in 2021 and 2022.

Keynote Speech 5 (online)

Prof. Hiroshi Nakajima (Kyushu Institute of Technology, Japan)

Title: Kinds of Intelligence

Abstract: There are many kinds of intelligent systems and services found in our daily life. Recently, newly named X-Techs are used in various domains, i.e., Healthcare Tech, FinTech, Ed Tech, HR Tech, Factory Tech Traffic Tech, and many. The systems and services integrate various types of technologies with "intelligence". Even though it would be hard to define "intelligence", it could be classified. Some theories of intelligence have been founded as the ideas of taxis from psychology area such as theory of multiple intelligence, two-factor theory of intelligence, structure of intellect theory, and so forth. In the talk, novel classification will be introduced by employing the idea of intelligence sources. We could extract different kinds of intelligence from the different sources such as textbook, human, data and nature. Each intelligence source has the interesting feature. Textbook intelligence has the nature of generality, human one provides authority, data one takes care of individuality, and nature one finds universality. Explanation of some applications will follow the brief introduction to kinds of intelligence.

Bio: Hiroshi Nakajima received the B.Eng. degree in System Engineering from Kobe University, Japan, in 1985, and Ph.D. degree in Systems Information Science from Kumamoto University, Japan, in 2004. He is working as Distinguished Specialist of Technology at Omron Corporation and Guest Professor at Kyushu Institute of Technology. He has also served as the president of Japan Society for Fuzzy Theory and Intelligent Informatics. He is a member of IEEE SMC, ACM, SOFT, JSAI, IPSJ, and JSKE. He received the best paper award from Interaction'99 in 1999, the best author award from Information Processing Society of Japan in 2000, the Industrial Outstanding Application Award from International Fuzzy Systems Association in 2007, the best paper award from Japan Society for Fuzzy Theory and Intelligent Informatics in 2009, Biomedical Wellness Award from SPIE in 2011, and the new technology development award from Japan Society for Medical and Biological Engineering.

Nov.5, 8:30-9:10
No.5 Building, 2nd Floor, Jinyuan Hall
Zoom ID: 788 378 7603(Password：iwaciii)

Keynote Speech 6 (on site)

Prof. Takeshi Ikenaga (Waseda University, Japan)

Title: Artificial brain-vision computer for creating seamless interactive applications between real and virtual worlds

Abstract: In a situation where all human activities are frequently carried out on a global scale, there is a limit to what can be done only in real space. So, an environment that can seamlessly merge the real and virtual worlds is highly expected. To achieve this, the following three are important: 1) Ultra-high-definition videos that exceed the resolution of the human retina, 2) Ultra-realistic content where the difference from the real cannot be recognized, and 3) Ultra-low delay that humans do not perceive. As for the ultra-high-definition video, advances in video compression technology have made it possible to easily use 8K or 360-degree video. As for the ultra-realistic content, technologies such as deep-learning based generated AI images that are indistinguishable from the real are also being developed. On the other hand, research efforts focused on the ultra-low delay processing are still limited, and many breakthroughs are expected. This presentation introduces our proposed "Artificial Brain-vision Computer". The human brain consists of the cerebrum which processes complex tasks and deep judgments, and the cerebellum which is capable of rather simple but instantaneous processing. The development of deep learning has expanded the possibilities of the cerebrum, but in order to create a whole brain-vision computer, it is essential to devise new algorithms and architecture that play the role of the cerebellum. While introducing our various examples of both rule-based and learning-based 1ms delay vision processing systems, the key technologies and future direction are explained.

Bio: Takeshi Ikenaga received the B.E. and M.E. degrees in electrical engineering and the Ph.D. degree in information computer science from Waseda University, Tokyo, Japan, in 1988, 1990, and 2002, respectively. He joined the LSI Laboratories, Nippon Telegraph and Telephone Corporation (NTT), in 1990, where he had been undertaking research on the design and test methodologies for high performance ASICs, a real-time MPEG2 encoder chip set, and a highly parallel LSI design for image understanding processing. He is currently a professor in the integrated system field with the Graduate School of Information, Production and Systems, Waseda University. His current interests are image and video processing systems, which covers video compression (e.g., VVC and SCC), video filter (e.g., super resolution and high-dynamic range imaging), and video recognition (e.g., sport analysis, human / object pose estimation, ultra-low delay vision systems).

Keynote Speech 7 (online)
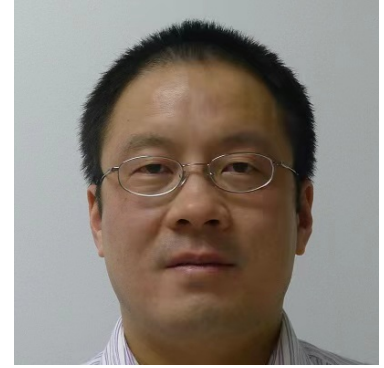
Prof. Minyi Huang (Carleton University, Ottawa, Canada)

Title: Mean Field Games for engineering

Abstract: Large-population dynamic non-cooperative decision problems are ubiquitous. They arise in a wide range of backgrounds including networks, electric vehicle charging control, economics and social sciences, finance, epidemic control, cyber-security, among others.

To analyze and design strategies in such systems, one must confront huge complexity resulting from high dimensionality. In this context, mean field game theory (Huang, Caines, Malhame (2003, 2006); Lasry and Lions (2006)) has been developed for dynamic non-cooperative games involving a large number of agents, where each agent interacts with the population average effect. This fundamental theory provides a powerful machinery to overcome the curse of dimensionality, and has led to wide engineering applications in recent years. This talk will explain how the theory of MFGs was initially developed based on ideas from statistical physics, and how to identify potential engineering scenarios where the methodologies of MGFs may be applied. Some accessible mathematical techniques will be described. If time permits, we will introduce related modeling extensions such as cooperative agents, major players and leadership, interaction of agents over a dense network, learning with limited model information, etc.

Bio:　Minyi Huang received the B.Sc. degree from Shandong University, Jinan, Shandong, China, in 1995, the M.Sc. degree from the Institute of Systems Science, Chinese Academy of Sciences, Beijing, in 1998, and the Ph.D. degree from the Department of Electrical and Computer Engineering, McGill University, Montreal, Canada, in 2003, all in systems and control.

He was a Research Fellow first in the Department of Electrical and Electronic Engineering, the University of Melbourne, Melbourne, Australia, from February 2004 to March 2006, and then in the Department of Information Engineering, Research School of Information Sciences and Engineering, the Australian National University, Canberra, from April 2006 to June 2007. In 2007, he joined the School of Mathematics and Statistics, Carleton University, Ottawa, Canada, where he is now a Professor. His research interests include mean field games and mean field control, multi-agent control and computation in distributed networks with applications.

Keynote Speech 8 (on site)

Prof. Long Wang (Peking University, China)

Title: Feedback Mechanisms, Aspiration Dynamics, and the New Paradigm of Collective Games

Abstract: Evolutionary game dynamics on complex networks consist of three components: games, network structures, and strategy updating rules. Games define the set of individual strategies and the mapping from strategy profiles to payoffs; network structures indicate who can interact with whom; strategy updating rules specify how individuals use their own and social information to determine their future strategies. As is well known, the evolutionary outcomes of such feedback dynamical systems induced by imitation-based update rules are sensitive to model characteristics, such as network structures and ways of imitation. Consequently, it is often difficult to generalize conclusions under imitation-based update rules across different models (Ohtsuki, et al. Nature, 2006；Allen, et al. Nature, 2017). By contrast, self-evaluation-based update rules are shown to generate invariant evolutionary outcomes on both complete and regular graphs. In this talk, I will introduce our recent work on evolutionary dynamics under self-evaluation-based update rules (namely, aspiration dynamics) over arbitrary weighted networks (Zhou, Wu, Du, and Wang. Nature Communications, 2021). We prove that under mild conditions, aspiration dynamics generate invariant evolutionary outcomes for any type of weighted networks, any distribution of aspiration values, and for individualized ways of self-evaluation. In other words, aspiration dynamics generate robust predictions for heterogeneous feedback systems. Our theoretical derivation and numerical simulations reveal the intrinsic difference between imitative and aspiration dynamics, highlighting the advantage of generating robust predictions under aspiration dynamics.

Bio: Long Wang was born in Xi'an, China. He received the B.E. degree from Tsinghua University, Beijing, in 1986, and the Ph.D. degree from Peking University, Beijing, in 1992, both in dynamics and control.

He has held research positions at the University of Toronto, Canada, and the German Aerospace Center, Munich, Germany. He is currently the Cheung Kong Chair Professor of Dynamics and Control, and the Director of Center for Systems and Control of Peking University. His research interests include complex networked systems, evolutionary game dynamics, artificial intelligence, and bio-mimetic robotics.

Keynote Speech 9 (online)

Prof. Jianwei Zhang (University of Hamburg, Germany)

Title: Robust robot cognition and control driven by models and crossmodal learning

Abstract: Robot systems are needed to solve real-world challenges by combining data-based machine learning with cognitive, kinematic, dynamic as well as physical models of cognitive abilities in intelligent systems. There has been substantial progress in crossmodal learning deep neural networks and LLMs in terms of data-driven benchmarking. However, such data-driven systems are computationally very costly and not yet interpretable, while most model-based approaches are not robust in an unstructured, dynamic, and changing world. My talk will first introduce concepts of cognitive systems that allow a robot to better understand multimodal scenarios by integrating knowledge and learning and then the necessary modules to enhance the robot intelligence level. Then I will explain how a robot can consolidate its model as a result of learning from experiences; and how such cross-modal learning methods can be realized in intelligent robots. In the end, I will demonstrate several novel robot systems with human-robot interaction, robust walking, and dexterous manipulation skills in potential service applications.

Bio: Jianwei Zhang is professor and Director of Technical Aspects of Multimodal Systems, Department of Informatics, University of Hamburg Germany. He is Academician of the German National Academy of Engineering Sciences and the Academy of Sciences and Humanities in Hamburg Germany. He is Distinguished Visiting Professor of Tsinghua University. He received both his Bachelor of Engineering (1986, Computer Control, with distinction) and Master of Engineering (1989, AI) at the Department of Computer Science of Tsinghua University, Beijing, China, and his PhD (1994, Robotics) at the Institute of Real-Time Computer Systems and Robotics, Department of Computer Science, University of Karlsruhe, Germany. Jianwei Zhang´s research interests include multimodal information (visual, auditory, tactile, etc.) processing; cognitive sensor fusion for robot perception; real-time learning algorithms; modelling of sensory-motor control tasks; natural human-robot interaction; learning and control of robot grasping and in-hand manipulation; experience-based robot learning; bi-manual robot assembly of 3D aggregates; mobile manipulation service robots, etc. In these areas, he has published over 500 journal and conference papers, and holds over 50 patents of robot mechatronic design, novel robot arms and end-effectors, modular robots, etc. He is the General Chair of IEEE MFI (Multisensor Fusion and Integration) 2012, IEEE/RSJ IROS (Intelligent Robots and Systems) 2015, and HCR (Human-Centred Robotics) 2018, and Associated VP of IEEE Robotics Automation Society CAB, etc. He is the coordinator of the DFG/NSFC Transregional Collaborative Research Centre SFB/TRR169 "Crossmodal Learning: Adaptivity, Prediction and Interaction" since 2015. He also leads several EU robotics projects, including the RACE (Robustness by Autonomous Competence Enhancement) Project which was the first to apply high-level learning, planning and reasoning AI methods to service robots. He has received multiple best paper awards at several major robotic conferences.
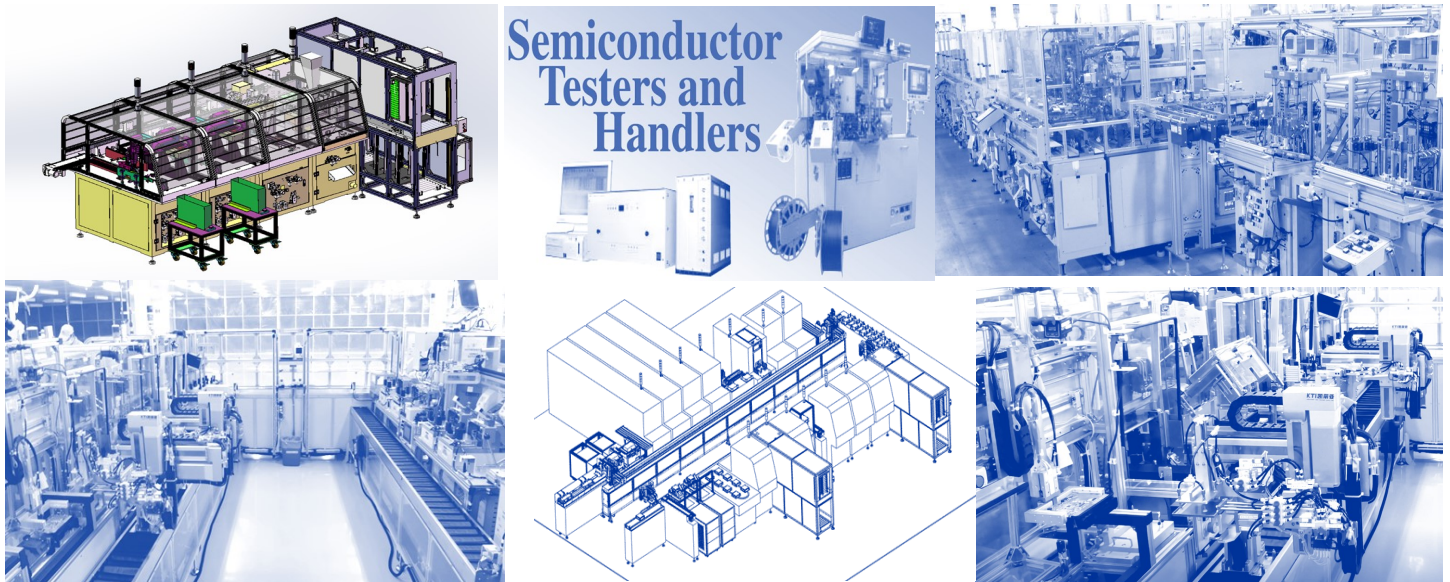
Keynote Speech 10 (online)

Prof. Chenguang Yang (University of West England, UK)

Title: Human-like Robot Control Design and Manipulation Skill Learning
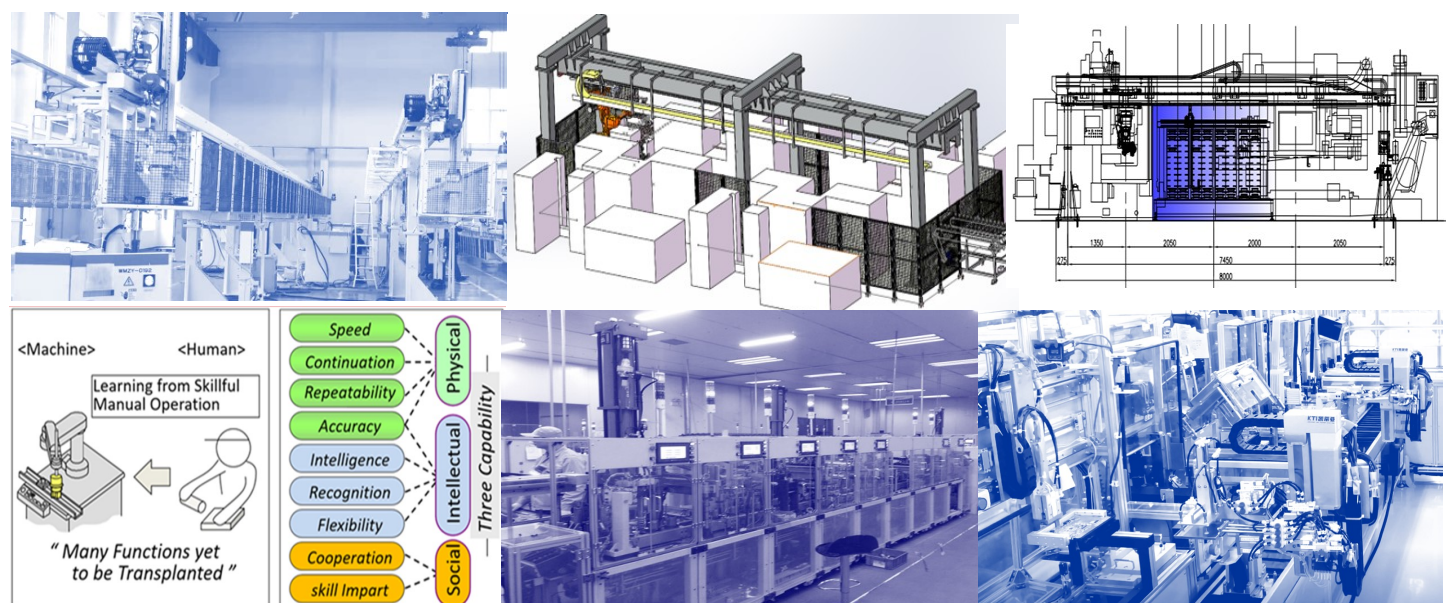
Abstract: This talk will introduce our advance in the field of robot skill learning and human-robot shared control. We use control theory to model the control mechanism of motor neurons to assist us developing human-like robot controllers so that the robot can realize variable impedance control to adaptively physically-interact with the changing environment. I will further talk about recent work on learning from demonstration which are generally used to efficiently transfer modularized skills to robots using multi-modal information such as surface electromyography signals and contact forces, enhancing the effectiveness of skill reproduction in different situations. Besides, with the help of deep learning, we design a simulation twin-based method that can transfer the trained skills in simulation to physical robot effectively.

Bio: Chenguang Yang is the leader of Robot Teleoperation Group of Bristol Robotics Laboratory, the Corresponding Co-Chair of the Technical Committee on Collaborative Automation for Flexible Manufacturing (CAFM), IEEE Robotics and Automation Society. He received PhD degree from the National University of Singapore (2010) and performed postdoctoral research at Imperial College London. He is a recipient of the prestigious IEEE Transactions on Robotics Best Paper Award (2012) and IEEE Transactions on Neural Networks and Learning Systems Outstanding Paper Award (2022) as lead authors. He has been awarded EPSRC Innovation Fellowship and EU FP-7 Marie Curie International Incoming Fellowship. He is a Fellow of Institution of Mechanical Engineers (IMechE), Institution of Engineering and Technology (IET), British Computer Society (BCS) and Higher Education Academy (HEA). He has served as Associate Editor of a number of leading international journals including IEEE Transactions on Robotics. He is an elected Member-at-Large of the Board of Governors with IEEE Systems, Man, and Cybernetics Society (SMC), and an AdCom member with IEEE Industrial Electronics Society (IES), 2023-2025.

Products & Services: Equipment for semiconductor and electronic product manufacturing engineering

Semiconductor Testers and Handlers

Products & Services: ATS & Intelligent manufacturing equipment

<Machine>   <Human>

Learning from Skillful Manual Operation

" Many Functions yet to be Transplanted "

Speed
Continuation — Physical
Repeatability
Accuracy
Intelligence
Recognition — Intellectual — Three Capability
Flexibility
Cooperation
skill Impart — Social

Products & Services: DX Digital Intelligent factory and Intelligent transportation system under the Cloud platform
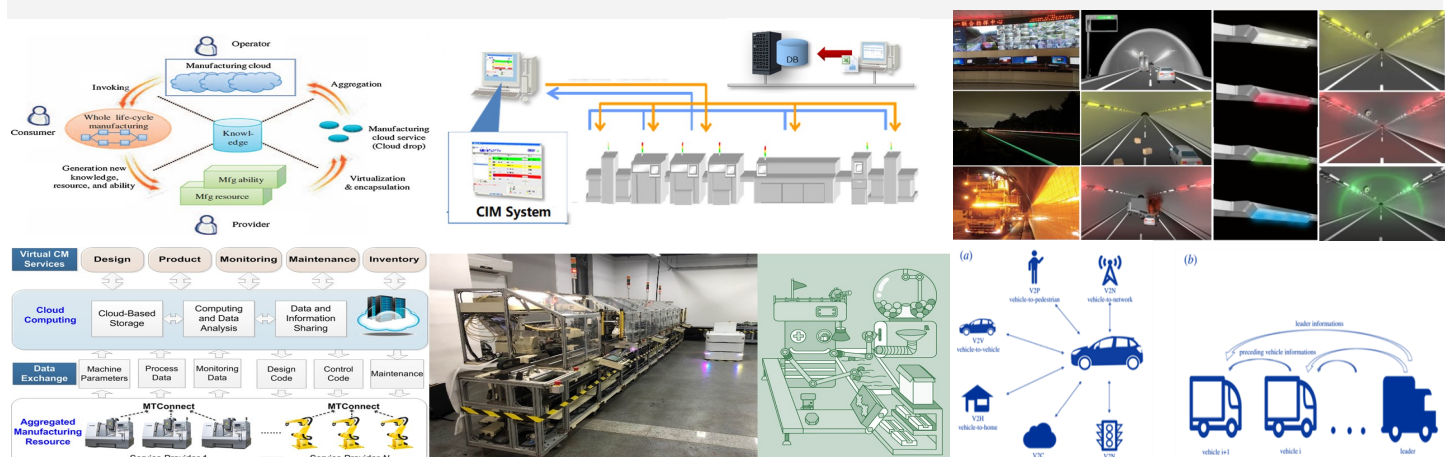
Our company "KTI" started operations in Japan in November 2005. Since then, our worldwide marketing activities have lasted for more than 18 years. Many customers in worldwide related industries such as semiconductor, automotive, new energy, etc. are using our products.

During this period, KTI Semiconductor Manufacturing Equipment Co., Ltd. and KTI Intelligence Equipment Manufacturing Co.,Ltd Together with KTI Japan, we operate as the KTI Group.

Our company name is an acronym for "Knowledge & Know-how, Technology, Innovation. We aim to be First One, Only One, and Best One in providing our customers with the best products and services.

KTI Group will continue to strive as a professional technology team to provide automated, intelligent, and highly efficient equipment to our global customers' production sites through joint development, design and manufacturing, installation, and service.
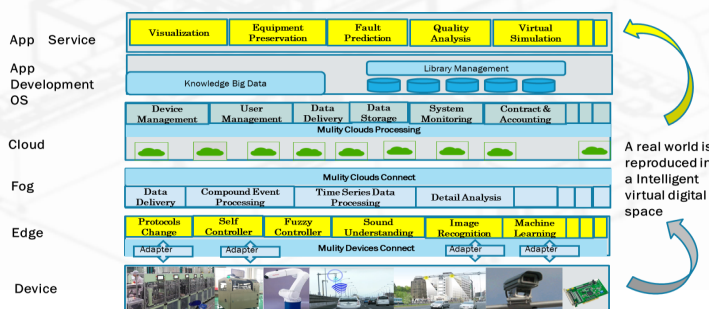
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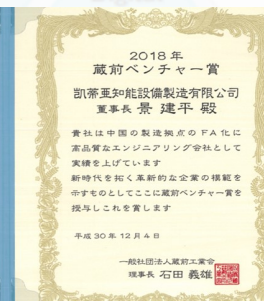
Company Philosophy:

We aim to be an international, innovative company that contributes positively to the progress of society based on the happiness of all employees.

KTI's team of engineers respects creative work, the intellectual property of our clients, and the importance of knowing that property in our daily work.

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KTI Intelligent Machine Manufacturing Co., Ltd / Nantong
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