



# 2023 9th International Conference on Control, Automation and Robotics

## 2023 年第九届控制、自动化和机器人国际会议

Beijing, China | April 21-23, 2023

中国, 北京 | 2023 年 4 月 21-23 日

Co-sponsored by



北京航空航天大学  
BEIHANG UNIVERSITY



Hosted by



北航 交通科学与工程学院  
School of Transportation Science and Engineering BUAA

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# Table of Contents

## 目录

<b>Welcome Message .....</b>	<b>2</b>
<b>Conference Schedule .....</b>	<b>3</b>
<b>Session Information .....</b>	<b>5</b>
<b>Local Information .....</b>	<b>6</b>
<b>Online Guideline .....</b>	<b>7</b>
<b>Organizing Committees .....</b>	<b>8</b>
<b>Conference Speakers .....</b>	<b>11</b>

### Apr. 22<sup>nd</sup> Onsite Conference

Special Session 1A..... 19	Special Session 3A..... 20
Special Session 4A ..... 21	Special Session 5..... 32
Special Session 6..... 23	Session 7..... 24

### Apr. 23<sup>rd</sup> Online Conference

Special Session 1B ..... 26	Special Session 2..... 27
Special Session 1C..... 28	Special Session 3B ..... 29
Special Session 4B..... 30	Session 8 ..... 31
<b>Closing &amp; Awards .....</b>	<b>32</b>
<b>Presenters Index .....</b>	<b>33</b>

# Welcome Message

## 欢迎辞

On behalf of the conference committees, we are pleased to welcome you to 2023 9th International Conference on Control, Automation and Robotics (ICCAR), which will be held in Beijing, China on April 21-23, 2023. ICCAR 2023 is co-sponsored by Beihang University (China) and IEEE, hosted by School of Transportation Science and Engineering BUAA (China), supported by Tsinghua University (China), Beijing Institute of Technology (China), University of Science and Technology Beijing (China), Nankai University (China), Osaka Metropolitan University (Japan), Pontifical Catholic University of Peru (Peru), Politecnico di Milano (Italy), etc. We would like to invite you to participate in this international conference, to share your latest research findings, innovations, and ideas in the fields of control, automation and robotics.

ICCAR 2023 will provide a unique platform for attendees to explore current and emerging trends in these fields, as well as network with other like-minded individuals and organizations. The conference program will include keynote speeches, technical presentations, and interactive workshops covering topics such as intelligent systems, machine learning and computer vision, mechatronics, robotics and automation, and control and optimization.

It's our great pleasure to invite 7 prestigious experts and professors to deliver the latest information in their respective expertise areas, they are:

Prof. Yuanqing Xia, Beijing Institute of Technology, China

Prof. Yan Shi, Beihang University, China

Prof. Degang Xu, Central South University, China

Prof. Cailian Chen, Shanghai Jiao Tong University, China

Prof. Yan-Wu Wang, Huazhong University of Science & Technology, China

Prof. Jing Liang, Zhengzhou University, China

Prof. Hao Zhang, Tongji University, China

We'd like to express our sincere gratitude to everyone who has contributed to ICCAR 2023 as its success could have only been achieved through a team effort. Additionally, our thanks go to all the conference committees, for putting the conference together; as well as to all the technical committee members and reviewers for their excellent work in reviewing the papers and their other academic support efforts. Finally, we are particularly grateful to all the authors and presenters of the papers as well as all the attendees for their contributions to this wonderful conference.

Finally, we hope you have a fruitful and memorable experience at ICCAR 2023!

With Warmest Regards,  
Conference Organizing Committees

# Conference Schedule

## 会议日程

### April 21<sup>st</sup> (Friday, GMT+8) | 4月21日 (周五)

Onsite Meeting 北京线下会议签到		
10:00-17:00	Registration & Collecting Conference Material   1楼酒店大厅	
Online Meeting Test 线上会议测试		
Zoom Link	ZOOM ID: 85074691857 <a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>	ZOOM: 89512386100 <a href="https://us02web.zoom.us/j/89512386100">https://us02web.zoom.us/j/89512386100</a>
10:00-12:00	Special Session 1B, 1C, 4B	Special Session 2, 3B, Session 8
Zoom Link	Zoom ID: 850 7469 1857 <a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>	
15:00-16:00	Conference Speakers, Session Chairs	

### April 22<sup>nd</sup> (Saturday, GMT+8) | 4月22日 (周六)

Room	The 16th Conference Room (B1 Floor)   B1层第十六会议室		
Zoom	Zoom ID: 850 7469 1857	Link: <a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>	
Speech Host	Prof. Hui Zhang, Beihang University, China		
09:30-09:40	Opening Remarks	<i>Prof. Shichun Yang</i> , Beihang University, China Dean of School of Transportation Science and Engineering, BUAA	
		<i>Prof. Luyuan Wang</i> , China Academy of Space Technology, Beijing Institute of Spacecraft System Engineering	
09:40-10:10	Invited Talk	<i>Prof. Yuanqing Xia</i> , Beijing Institute of Technology, China Speech title: Workflow Scheduling in Cloud Control Systems	
10:10-10:40	Invited Talk	<i>Prof. Yan Shi</i> , Beihang University, China Speech title: Pressure Control Study on Mechanical Ventilation Based on Adaptive Fuzzy-PID Compensation	
10:40-11:20	Group Photo & Coffee Break		
11:20-11:50	Invited Talk	<i>Prof. Degang Xu</i> , Central South University, China Speech title: Intelligent Perception and Precise Control Method of Slag Removal Robot for Non-Ferrous Metal Casting Process	
12:00-14:00	Lunch Time		
Room	第十六会议室	第八会议室	第六会议室
14:00-15:30	Special Session 1A RA0236, RA0281A, RA0282A RA0318, RA0400, RA0402	Special Session 3A RA0261, RA0215 RA0398, RA0267, RA0228	Special Session 4A RA0248, RA0220, RA0264 RA0310, RA0317A, RA0278A RA0249
15:30-16:00	Coffee Break		
16:00-17:30	Special Session 5 RA0243, RA0397, RA0336 RA0263, RA0274	Special Session 6 RA0269, RA0233, RA0410 RA0412, RA0294, RA0321	Session 7 RA0381, RA0315, RA0330 RA0360, RA0375, RA0358
17:30-19:00	Conference Dinner		

April 23<sup>rd</sup> (Sunday, GMT+8) | 4月23日 (周日)

Women in Control, Automation and Robotics (CAR) -女性学者专场		
	Zoom ID: 850 7469 1857 Link: <a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>	
09:30-09:35	Welcome & Host	<i>Prof. Lu Liu</i> , City University of Hong Kong, China
09:35-10:05	Invited Talk	<i>Prof. Cailian Chen</i> , Shanghai Jiao Tong University, China Speech title: Heterogeneous Data Deterministic Transmission for Factory Automation
10:05-10:35	Invited Talk	<i>Prof. Yan-Wu Wang</i> , Huazhong University of Science and Technology, China Speech title: Cooperative Control in DC Microgrid: Voltage Regulation and Current Sharing
10:35-10:45	Coffee Break	
10:45-11:15	Invited Talk	<i>Prof. Jing Liang</i> , Zhengzhou University, China Speech title: Evolutionary Constrained Multiobjective Optimization
11:15-11:45	Invited Talk	<i>Prof. Hao Zhang</i> , Tongji University, China Speech title: Multi-agent Formation Navigation in a Feasible Space-constrained Environment
12:00-13:30	Lunch Break	
Online Parallel Sessions-线上平行会场		
	Zoom ID: 860 1556 7851 Link: <a href="https://us02web.zoom.us/j/86015567851">https://us02web.zoom.us/j/86015567851</a>	Zoom ID: 831 9464 1295 Link: <a href="https://us02web.zoom.us/j/83194641295">https://us02web.zoom.us/j/83194641295</a>
13:00-14:30	Special Session 1B RA0335, RA0142, RA0250 RA0298, RA0240, RA0299	Special Session 2 RA0365, RA0132, RA0270 RA0371, RA0277, RA0339
	Zoom ID: 850 7469 1857 Link: <a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>	Zoom ID: 895 1238 6100 Link: <a href="https://us02web.zoom.us/j/89512386100">https://us02web.zoom.us/j/89512386100</a>
13:30-15:15	Special Session 1C RA0272, RA001, RA0043 RA0285, RA0369, RA0392, RA0399	Special Session 3B RA0356, RA0414, RA0396, RA0383 RA0291, RA0300, RA0245, RA0211
15:15-15:45	Coffee Break	
15:45-17:30	Special Session 4B RA0280, RA0287, RA0219 RA0254, RA0372, RA0122, RA0406	Session 8 RA0062, RA0380, RA0295 RA0072, RA0224, RA0112
Closing Ceremony & Awards 闭幕式 & 会议颁奖 (线上)		
	Zoom ID: 850 7469 1857 Link: <a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>	
18:00-18:20	Host	<i>Prof. Hamid Reza Karimi</i> , Politecnico di Milano, Italy

# Session Information

## 分会概览

### Special Session 1

Control of Advanced Robotic and Mechatronic Systems

先进机器人及机电系统控制

### Special Session 2

Intelligent and Sustainable Solutions for Liveable Cities

宜居城市的智能和可持续解决方案

### Special Session 3

Autonomous Safety Control in Aerospace Applications

航空航天领域中的自主安全控制

### Special Session 4

Intelligent Perception and Control of Networked Motion Control Systems

网络化运动控制系统智能感知与控制

### Special Session 5

Advanced Fluid Power Transmission and Control

先进流体传动与控制

### Special Session 6

Space Intelligence Dexterous Operation

空间智能灵巧操作

### Session 7

Object Detection and Machine Vision

物体检测与机器视觉

### Session 8

The Application of Intelligent Image Processing in Modern Electronic Information Systems

智能图像处理在现代电子信息系统中的应用

# Local Information

## 会场须知



### 北京京仪大酒店

地址：北京海淀区大钟寺东路 9 号

(毗邻中坤广场和体育大学地铁 13 号 10 号知春路站 B 出口，紧邻北三环联想桥、大钟寺)

### 签到地点 | 酒店 1 楼大厅

### 会场注意事项

1	注意安全防范, 妥善保管好个人财物、资料, 休息或离开房间时务必锁好房门
2	请各位嘉宾根据日程安排按顺序报告, 并关注临时通知
3	会场多媒体设备由会务组统一提供, 报告者可通过拷入 U 盘的方式, 提前备好演讲文稿电子版 (PPT/PDF) 用于测试、报告等; 每位演讲者报告时长包括演讲和提问交流时间
4	本次会议凭借胸卡进入会场, 凭餐券用餐, 请随身携带
5	遵守会场秩序, 会议开始前请将手机调至静音, 保持会场安静

### 乘车指南

地铁线路	地铁 10 号线、13 号线知春路站下, B 口出, 向西 100 米, 见到路口后左拐 (向南拐), 步行 5 分钟即到, 位于马路西侧
公交线路	乘坐 361 路、323 快、425 路、87 路、88 路、718 路、特 8 路、运通 101 路、运通 201 路, 在大钟寺站下车, 向东北方向走 200 米即到, 马路西侧
自驾线路	由西向东方向, 北三环四通桥出口出, 由东向西方向, 蓟门桥出口出, 辅路行至联想东桥后, 向北 500 米即到
北京首都国际机场	从首都机场乘坐地铁机场线在三元桥站下车, 换乘地铁 10 号线在知春路站下车, 向南步行 5 分钟到达京仪大酒店
北京火车站	从北京站出发乘坐地铁 2 号线(内环), 西直门站下车, 下车步行约 200 米, 换乘地铁 13 号线(西直门-东直门), 在知春路站下车 向南步行 5 分钟到达京仪大酒店
北京西客站	从北京西客站乘坐 695 路公交汽车, 在北京西站 上车, 至 大钟寺 站下车, 步行约 100 米到达京仪大酒店

# Online Guideline

## 线上会议须知

### Test before Formal Meeting 会前设备测试

#### Date: 21<sup>st</sup> April

Before the formal meeting, presenters shall join the test room to ensure everything is good.

### Time Zone 时区

#### Beijing Time (GMT+8)

You're suggested to set up the time on your laptop in advance.

### Equipment & Environment Needed 报告环境须知

- A laptop with stable internet connection and camera
- Headphones
- A quiet place
- Proper lighting and background

### Software 会议软件



#### ZOOM Download:

- <https://zoom.us/download>
- For Chinese Users: <https://zoom.com.cn/download>

### Presentation Tips 报告指南

- Parallel Presentation Timing: a maximum of **15 minutes** in total, including 3 minutes for Q&A.
- It is suggested that the presenter email a copy of his/her video presentation to the conference email as a backup in case any technical problem occurs.

### Conference Recording 会议录制

- The whole conference will be recorded. We appreciate you proper behavior and appearance.
- The recording will be used for conference program and paper publication requirements. The video recording will be destroyed after the conference and it cannot be distributed to or shared with anyone else, and it shall not be used for commercial nor illegal purpose. It will only be recorded by the staff and presenters have no rights to record.



# Organizing Committees

## 会议组委会

### Honorary Chair 名誉主席

Shichun Yang, Beihang University, China

### Conference Chair 大会主席

Hui Zhang, Beihang University, China

### Conference Co-chair 大会联合主席

Yang Shi, University of Victoria, Canada

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Oleg Yakimenko, Naval Postgraduate School, USA  
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### **Publication Chairs 出版主席**

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Dan Zhang, Zhejiang University of Technology, China  
Lin Zhao, National University of Singapore, Singapore

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Manuel Jr. Ramos, University of the Philippines Diliman, Philippines

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Hyungpil Moon, Sungkyunkwan University, Republic of Korea  
Seng Ki Moon, Singapore Institute of Manufacturing Technology, Singapore  
Radu-Emil Precup, Universitatea Politehnica Timisoara, Romania (Member, IEEE)  
Manuel Jr. Ramos, University of the Philippines Diliman, Philippines  
Andre Rosendo, ShanghaiTech University, China (Member, IEEE)  
Sergei Semakov, Moscow Institute of Physics and Technology and Moscow Automobile and Road  
Construction Institute, Russian Federation (Member, IEEE)  
Ying Shi, Changchun Institute of Technology, China  
Jennifer C. Shih, University of California, Berkeley  
Aiguo Song, Southeast University, China  
Bassel Soudan, University of Sharjah, United Arab Emirates  
Ibrahim Sultan, Federation University, Australia (Member, IEEE)  
Belen M. Tapado, Polytechnic University of the Philippines, Philippines  
Tsuyoshi Usagawa, Kumamoto University, Japan (Member, IEEE)  
Zhiling Wang, Hefei Institutes of Physical Science, Chinese Academy of Sciences, China  
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Jonghun Yoon, Hanyang University ERICA, South Korea  
Yupeng Yuan, Wuhan University of Technology, China  
Chengliang Zhang, University of Jinan, China  
Xiaocong Zhu, Zhejiang University, China  
Yaguang Zhu, Chang'an University, China (Member, IEEE)  
Chungang Zhuang, Shanghai Jiao Tong University, China  
Eugenia Zhuo, University of Santo Tomas, Philippines (Member, IEEE)

# Conference Speaker

## 大会报告人



### Prof. Yuanqing Xia

Beijing Institute of Technology, China

夏元清 教授, 北京理工大学  
长江/杰青/万人计划领军人才、自动化学院院长



Beijing Time:	09:40-10:10, Apr. 22 <sup>nd</sup> , 2023	Onsite Room:	The 16th Conference Room (B1 Floor)
ZOOM ID:	850 7469 1857	ZOOM Link:	<a href="https://us02web.zoom.us/j/85074691857">https://us02web.zoom.us/j/85074691857</a>

### Workflow Scheduling in Cloud Control Systems

**BIO** Yuanqing Xia is a chair professor and doctoral supervisor at Beijing Institute of Technology. He is now the dean of School of Automation, Beijing Institute of Technology. In 2012, he obtained the National Science Foundation for Distinguished Young Scholars of China, and in 2016, he was honored as the Yangtze River Scholar Distinguished Professor and was supported by National High Level Talents Support Plan (“Million People Plan”) by the Organization Department of the CPC Central Committee. In 2017, he was approved to enjoy the government allowances of the State Council. His current research interests are in the fields of networked control systems, robust control and signal processing, active disturbance rejection control, flight control and cloud control. He has published eight monographs in Springer and John Wiley, and more than 200 papers in journals. He is an Editor in deputy of the Journal of the Beijing Institute of Technology, Associate Editor of Acta Automatica Sinica, Control Theory and Applications, International Journal of Innovative Computing, Information and Control, International Journal of Automation and Computing. He is currently the director of ized committee on cloud control and decision of Chinese Institute of Command and Control (CICC), the vice chairman of China Internet of Things Working Committee, the director of the ninth Council of the Systems Engineering Society of China, and the director of the first Council of CICC.

**ABSTRACT** With the development of cloud computing, more and more workflow applications have been migrated to the cloud. Workflows scheduling becomes a challenging issue for meeting various quality of service (QoS) constraints due to the large scale of workflows and elasticity and heterogeneity of cloud resources. In this talk, we will present our recent works on workflows scheduling in cloud control systems. Firstly, we propose a Scoring and Dynamic Hierarchy-based NSGA-II (Nondominated Sorting Genetic Algorithm II) to minimize both makespan and cost of workflow execution and design a Multi-swarm Co-evolutionary-based Hybrid Optimization (MCHO) algorithm for multiple-workflow scheduling to minimize total makespan and cost while workflow deadline constraints. Then, we introduce some workflow scheduling strategies which is based on the intelligent optimization algorithm for solving constrained optimization workflow scheduling problems in cloud control systems. Furthermore, we focus on the workflows dynamic scheduling problem and design the multi-workflows scheduling algorithms with uncertainty in clouds to minimize total cost and improve cloud resource utilization. Finally, a cloud workflow management platform which can manage cloud workflows efficiently is developed to support the implementation of scheduling algorithms and the application of workflow scheduling in cloud control systems is introduced with the workflow management platform.

# Conference Speaker

## 大会报告人



### Prof. Yan Shi

Beihang University, China

石岩 教授, 北京航空航天大学  
国家“万人计划”青年拔尖人才

Beijing Time: 10:10-10:40, Apr. 22<sup>nd</sup>, 2023

Onsite Room: The 16th Conference Room (B1 Floor)

ZOOM ID: 850 7469 1857

ZOOM Link: <https://us02web.zoom.us/j/85074691857>

### Pressure Control Study on Mechanical Ventilation Based on Adaptive Fuzzy-PID Compensation

**BIO** Yan Shi is a professor in the School of Automation Science and Electrical Engineering, Beihang University, Beijing, China. He received his doctoral degree in mechanical engineering from Beihang University. His research interests include mechanical and electronic engineering, automatic control, fluid transmission and control intelligent medical devices, energy-saving technologies of pneumatic systems and pneumatic components design and processing key technologies. He has undertaken more than 20 national projects in recent years, and he was awarded an IET fellow in 2022. He has published more than 100 SCI papers, and has granted more than 20 national invention patents. He has won the second prize of the “National Science and Technology Progress Award” (rank 2), and two first prize for the Science and Technology Progress Award of national-level societies (rank 1). He has been selected as the Chief Scientist of the Key Basic Research Program (173 Program) of the JCJQ Program, the Project Leader of the National Key Research and Development Program, the Young Talent of the "Ten Thousand People Program".

**ABSTRACT** To improve the effectiveness and safety of ventilation device for critical patients, a new simulated ventilation device based on pneumatic system is proposed. In order to accurately settle the control pressure and response time of supplied air, an adaptive control algorithm on the mechanical ventilation based on fuzzy-PID is proposed. Both simulation and experimental studies on the airflow dynamics are conducted. For different patient's condition, we analyze three ventilation working situations with different settled pressure levels. The results show that the adaptive fuzzy-PID compensation regulation makes the increase and decrease of the pressure become smoother without high fluctuation, and lead to a better control. The overshoot of the ventilation device can be decreased to zero, control error can be limited within 2%, and response time can be reduced to about 1/30. This paper provides a constructive suggestion for the development of mechanical ventilator technologies.

## Conference Speaker

### 大会报告人



#### Prof. Degang Xu

Central South University, China

徐德刚 教授，中南大学  
自动化学院副院长

Beijing Time: 11:20-11:50, Apr. 22<sup>nd</sup>, 2023

Onsite Room: The 16th Conference Room (B1 Floor)

ZOOM ID: 850 7469 1857

ZOOM Link: <https://us02web.zoom.us/j/85074691857>

### Intelligent Perception and Precise Control Method of Slag Removal Robot for Non-Ferrous Metal Casting Process

**BIO** Degang Xu received the Ph.D. degree in control science and engineering from Zhejiang University, China, in 2007. From 2010 to 2013, he was a Postdoctoral Fellow with Central South University. He was with the Department of Electrical Engineering, University of Florida, United States of America, from 2013 to 2014. He is currently a Full Professor with Central South University. His current research interests include modelling and optimal control of complex industrial process, robots control system, and intelligent control system. Prof. Xu has published more than 90 papers on the IEEE Transactions on Industrial Electronics, IEEE Transactions on Cybernetics, and top international conferences. He has authored 2 research monographs. He is also the inventor of more than 30 patents. He was honored “Hunan Furong Young. Scholar” in 2022. He has established a very solid link with many Chinese industries including the field of the online detection technology intelligent control methods for Non-Ferrous metal production, intelligent systems for construction machinery and equipment. He won the Second Prize of Science and Technology Progress Award from the Nonferrous Metals Society of China in 2022, First Prize of Science and Technology Progress Award from The Quality Evaluation Society of China in 2017, respectively.

**ABSTRACT** The non-ferrous metal casting process is a process, which molten liquid metal is cast, cooled and crystallized into solid metal ingots in the casting mould. The metal ingot casting process is in a production environment with high temperature, strong toxicity and high risk. At present, it relies on manual operation to remove the oxide slag, which leads to high labour intensity, high safety risks and unstable product quality. In view of the urgent need to realize automatic operation in the non-ferrous metal casting process, the intelligent perception method based on multi-source information fusion of robot vision signal and force perception is proposed to realize online and accurate detection of the shape of metal ingot mould and semi-solid oxide slag, and the surface flatness of ingot after slagging. According to the characteristics of slag-raking process and operation requirements, the real-time trajectory planning and precise control methods of robots based on visual/force perception information are proposed. And the intelligent robot operation system is developed, which has been used to the intelligent slag-raking operation in the casting process.

# Conference Speaker

## 大会报告人



### Prof. Cailian Chen

Shanghai Jiao Tong University, China

陈彩莲 教授, 上海交通大学



Beijing Time: 09:35-10:05, Apr. 23<sup>rd</sup>, 2023

Special Section:

Women in Control, Automation and Robotics (CAR)

ZOOM ID: 850 7469 1857

ZOOM Link:

<https://us02web.zoom.us/j/85074691857>

## Heterogeneous Data Deterministic Transmission for Factory Automation

**BIO** Cailian Chen is currently a Distinguished Professor of Shanghai Jiao Tong University, Shanghai, P. R. China. Her research interests include industrial wireless networks and computational intelligence, and Internet of Things. She has authored 4 research monographs and over 100 referred international journal papers. She is the inventor of more than 30 patents. Dr. Chen received the prestigious "IEEE Transactions on Fuzzy Systems Outstanding Paper Award" in 2008, IEEE Technical Committee of Cyber-Physical Systems (TCCPS) Industrial Excellence Award in 2022, and 5 conference best paper awards. She won the Second Prize of National Natural Science Award from the State Council of China in 2018, First Prize of Natural Science Award from The Ministry of Education of China in 2006 and 2016, respectively, and First Prize of Technological Invention of Shanghai Municipal, China in 2017. She was honored "National Outstanding Young Researcher" by NSF of China in 2020 and "Changjiang Young Scholar" in 2015. She serves as Area Editor of National Science Open, and Associate Editor of IEEE Transactions on Vehicular Technology, and IET Cyber-Physical Systems: Theory and Applications. She also served as TPC Chair of ISAS'19, Symposium TPC Co-chair of IEEE Globecom 2016, Track Co-chair of VTC2016-fall and VTC2020-fall.

**ABSTRACT** With the rapid development of information and communication technology, industrial Internet of Things (IoT) integrated with wireless technology has been implemented in factory automation and promoted the integration of IT and OT. However, compared with the wired communication, wireless communication faces various new challenges. Complex and serious electromagnetic interference, dynamic and variable wireless links, and blocking of large mobile equipment lead to the difficulties on real-time, reliable and deterministic transmission in the fields of factory. By taking the full advantage of time-frequency-space multi-dimensional resources to design a cooperative transmission mechanism, it can effectively resist fading, suppress interference, and significantly improve end-to-end information transmission performance. In this talk, we will discuss the distributed dynamic sensing method and the design of deterministic transmission mechanism for heterogeneous data based on field-level industrial IoT. We propose the correlation feature learning mechanism and resource pre-allocation strategy for matching processes to avoid the complex handshake overhead under the traditional dynamic access mechanism, thus reducing access delay and jitter, and improving resource utilization. Time-sensitive network (TSN) gateway devices and testbed are developed to ensure the performance of heterogeneous data transmission. It enables the configuration flexibility and dynamic networking of on-site devices to enhance the field-level sensing and monitoring capability of industrial IoT.

# Conference Speaker

## 大会报告人



### Prof. Yan-Wu Wang

Huazhong University of Science and Technology, China

王燕舞 教授，华中科技大学  
华中科技大学华中卓越学者，教育部新世纪优秀人才



Beijing Time: 10:05-10:35, Apr. 23<sup>rd</sup>, 2023

Special Section:

Women in Control, Automation and Robotics (CAR)

ZOOM ID: 850 7469 1857

ZOOM Link:

<https://us02web.zoom.us/j/85074691857>

## Cooperative Control in DC Microgrid: Voltage Regulation and Current Sharing

**BIO** Yan-Wu Wang received the B.S. degree in automatic control, the M.S. degree and the Ph.D. degree in control theory and control engineering from Huazhong University of Science and Technology (HUST), Wuhan, China, in 1997, 2000, and 2003, respectively. She has been a Professor with the School of Artificial Intelligence and Automation, HUST, since 2009. Her research interests include hybrid systems, cooperative control, and multiagent systems with applications in smart grid. Currently she serves in the editor boards of several journals, including IEEE Transactions on Smart Grid, International Journal of Robust and Nonlinear Control, Journal of the Franklin Institute, and Neurocomputing. Dr. Wang was a recipient of several awards, including the first prize of Natural Science Award of Hubei Province in 2014, the first prize of Natural Science Award of the Ministry of Education of China in 2005, and the Excellent PhD Dissertation of Hubei Province in 2004, China. In 2008, she was awarded the title of "New Century Excellent Talents" by the Ministry of Education of China.

**ABSTRACT** DC microgrid is a power system that consists of distributed generators, energy storage facilities, energy conversion devices, and power loads. By integrating various power sources, DC microgrid is essential in promoting sustainable energy development and thus it becomes an important part of smart grid construction. In a DC microgrid, it is critical to coordinate multiple power sources to ensure a stable power supply for the loads. This typically involves two control objectives: maintaining a stable bus voltage and achieving reasonable current sharing among the sources. This talk will focus on the cooperative power supply control of multiple sources from three aspects: how to improve the convergence rate and the dynamic performance; how to reduce the communication burden during the control process; how to ensure the performance against potential attacks. We will also discuss the possible research topics in the future.



# Conference Speaker

## 大会报告人



### Prof. Jing Liang

Zhengzhou University, China

梁静 教授, 郑州大学  
电气工程学院院长



Beijing Time: 10:45-11:15, Apr. 23<sup>rd</sup>, 2023

Special Section:

Women in Control, Automation and  
Robotics (CAR)

ZOOM ID: 850 7469 1857

ZOOM Link:

<https://us02web.zoom.us/j/85074691857>

## Evolutionary Constrained Multiobjective Optimization

**BIO** Jing Liang is a Professor at Henan Institute of Technology, China. She is the deputy Party secretary and vice-principal. She received the B.E. degree from Harbin Institute of Technology, China and the Ph.D. degree from the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. Her main research interests are evolutionary computation, swarm intelligence, multiobjective optimization, and neural network. Prof. Liang is a member of the IEEE Computational Intelligence Society (CIS) and a member of the IEEE Computational Intelligence Society Emergent Technology Technical Committee (IEEE CIS ETTC). She has obtained the NSFC Outstanding Youth Science Fund Project. She won the IEEE CIS Outstanding Ph.D. Dissertation Award, the Second prize of Natural Science Award of Ministry of Education, 2021 and 2022 Highly Cited Chinese Researcher (Scopus ELSEVIER), Outstanding Young Science and Technology Experts in Henan Province, High-Level Talents in Henan Province, Chief Science Popularization Expert of Henan Province, and IEEE Transactions on Evolutionary Computation (TEVC) Outstanding Associate Editor.

**ABSTRACT** Constrained multiobjective optimization problems (CMOPs) widely exist in scientific research and practical applications. They involve multiple objectives to be optimized and various constraints to be satisfied, which proposes serious challenges for solvers. During the past several decades, evolutionary algorithms have been widely used to solve multiobjective optimization problems because they have better global search ability and can output a set of non-dominated solutions. In this report, CMOPs and research difficulties will be described in detail. Then, three kinds of constrained multiobjective evolutionary algorithms, including objective information utilization-based evolutionary algorithms, evolutionary multitasking-based evolutionary algorithms, and constrained multi-modal multiobjective evolutionary algorithms, will be introduced. For objective information utilization-based evolutionary algorithms, single-phase and two-phase algorithms will be introduced, and they mainly utilize objective information to explore infeasible regions and maintain diversity. For evolutionary multitasking-based evolutionary algorithms, they transform a CMOP into a multitasking optimization problem by creating simple auxiliary tasks with fewer constraints. Moreover, two algorithms focus on what to transfer and the form of auxiliary task will be introduced. For constrained multi-modal multiobjective evolutionary algorithms, they consider the multi-modal characteristics and aim to find multiple equivalent feasible Pareto optimal solution sets. Meanwhile, a new benchmark test suite and a new performance indicator will be introduced. Finally, the future works on evolutionary constrained multiobjective optimization will be given.

# Conference Speaker

## 大会报告人



### Prof. Hao Zhang

Tongji University, China

张皓 教授, 同济大学  
电子与信息工程学院副院长



Beijing Time:

11:15-11:45, Apr. 23<sup>rd</sup>, 2023

Special Section:

Women in Control, Automation and  
Robotics (CAR)

ZOOM ID:

850 7469 1857

ZOOM Link:

<https://us02web.zoom.us/j/85074691857>

## Multi-agent Formation Navigation in a Feasible Space-constrained Environment

**BIO** Professor Zhang graduated from Huazhong University of Science and Technology with PhD in Control Theory and Control Engineering in 2007. In September 2007, she taught at the Department of Control Science and Engineering in the College of Electronic and Information Engineering, Tongji University. In 2010, she was awarded associate professor and supervisor for master students. From December 2011 to December 2013, she worked as a "Xiang Jiang Scholar" to do the postdoctoral research in the Department of Mechanical and Biological Engineering in the City University of Hong Kong, whose collaborator is the IEEE Fellow Professor Gary Feng. Her research interests include the Autonomous systems, multi-agent systems, data based optimization and control, safety and security, multi-robot systems and so on. She has published over 100 papers, and over 90 papers are published on Automatica and IEEE transaction magazine, 13 authorized invention patents. She won eight provincial and ministerial awards, including one First Prize of Shanghai Natural Award, two First Prize of Shanghai Science and Technology Progress, and one Second Prize of Ministry of Education Natural Award.

**ABSTRACT** In recent years, the rapid development of sensor and communication technology enables the application of multi-agent coordination in complex environments, such as geographical exploration, search and rescue, cooperative reconnaissance and monitoring. Under this trend, multi-agents systems are more likely to work in cluttered environments, where safety constraints like obstacles and inter-agent collision avoidance can not be ignored. We will explore in this talk on how to systematically integrates collision-free navigation into multi-agent formation.

# Onsite Sessions

Beijing, China | April 22, 2023

中国, 北京 | 2023年4月22日

# Special Session 1A

## Control of Advanced Robotic and Mechatronic Systems

### 先进机器人及机电系统控制

Chair: Zhiyang Ju, Beijing Institute of Technology, China

Beijing Time: 14:00-15:30  
22nd Apr. 2023

The 16th Conference Room (B1 Floor)  
B1 层第十六会议室

**RA0236**

14:00-14:15

State Feedback Fault Tolerant Control for Flexible Bevel-Tip Needle Based on Proportional Multiple-Integral Observer

Chaojie Zhu, Hui Zhang and Zhi Qi, **Hanwen Zhang**  
Beihang University, China

**RA0281A**

14:15-14:30

Coordinated Motion Planning of Dual Boom Cranes for Payload Non-Horizontal Transportation

**Zhuoqing Liu**, Tong Yang, Qingxiang Wu and Prof. Ning Sun  
Nankai University, China

**RA0282A**

14:30-14:45

Periodic SMC Method for 4-DOF Tower Crane Systems Under Unknown Control Direction

**Prof. Menghua Zhang**  
University of Jinan, China

**RA0318**

14:45-15:00

Unsupervised Time Series Anomaly Detection Based on Adversarial Interpolation and Pseudo-anomaly Calibration

**Prof. Xinwei Chen, Xiaohui Lin**, Zuoyong Li and Haoyi Fan  
Minjiang University, China

**RA0400**

15:00-15:15

Trajectory Planning of a Humanoid One-legged Robot with Tendon Elastic Actuation during Squatting after Landing

**Pengcheng Lin**  
Harbin Institute of Technology, China

**RA0402**

15:15-15:30

Deadlock-free Scheduling of Flexible Manufacturing Systems Subject to No-Wait Constraints

**Pei Yin** and Dr. Jianchao Luo  
Northwestern Polytechnical University, China

# Special Session 3A

## Autonomous Safety Control in Aerospace Applications

### 航空航天领域中的自主安全控制

Chair: Jing Chang, Xidian University, China

Maolong Lv, Air Force Engineering University, China

Beijing Time: 14:00-15:00

22nd Apr. 2023

The 8th Conference Room (B1 Floor)

B1 层第八会议室

**RA0261**

Obstacle Avoidance Based on Deep Reinforcement Learning and Artificial Potential Field

**Haoran Han**, Zhilong Xi, Jian Cheng, Maolong Lv

14:00-14:15

University of Electronic Science and Technology of China, China

**RA0215**

Multi-Time-Stage Collaborative Task Assignment for Heterogeneous UAVs Using CBBA

**Dr. Wenfei Wang**, Le Ru, Maolong Lv and Bo Lu

14:15-14:30

Air Force Engineering University, China

**RA0398**

Distributed Interval Observer-Based Fault Detection for A Class of Distributed Measurement Systems

Danxia Li, **Dr. Jing Chang**, Weisheng Chen and Jérôme Cieslak

14:30-14:45

Xidian University, China

**RA0228**

Improving Cooperative Multi-Target Tracking Control for UAV Swarm Using Multi-Agent Reinforcement Learning

**Dr. Longfei Yue**, Maolong Lv, Mengda Yan, Xiaoru Zhao, Ao Wu, Leyan Li, Jialiang Zuo

14:45-15:00

Air Force Engineering University, China

# Special Session 4A

## Intelligent Perception and Control of Networked Motion Control Systems

### 网络化运动控制系统智能感知与控制

Chair: Dan Zhang, Zhejiang University of Technology, China

Beijing Time: 14:00-15:45  
22nd Apr. 2023

The 6th Conference Room (B1 Floor)  
B1 层第六会议室

**RA0248**

Prescribed Performance Global Consensus Control of Non-Affine Multi-Agent Networks

**Dr. Ning Wang**, Xiaolin Wang, Wenjie Tian and Lei Zhang

14:00-14:15

Naval Aviation University, China

**RA0220**

Robust Model Predictive Control Based Cooperative Control of Uncertain Connected Vehicle Platoon Systems

**Hao Zeng**, Zehua Ye and Prof. Dan Zhang  
Zhejiang University of Technology, China

14:15-14:30

**RA0264**

Neural-adaptive Quantized Consensus Tracking Control of High-order Power-chained Nonlinear Multi-agent Networks with Switched Dynamics: A Specified-Time Convergence Protocol

**Dr. Chuhan Zhou** and Ying Wang  
Air Force Engineering University, China

14:30-14:45

**RA0310**

Contour Tracking Control of Networked Motion Control System Using Improved Equivalent-Input-Disturbance Approach

**Wenjie Lin**, Guangpu Huang, Qun Lu, Lifeng Luo, Xiang Wu and Dan Zhang  
Zhejiang University of Technology, China

14:45-15:00

**RA0317A**

A Hybrid Event-Triggered Stabilization Approach for Switched Systems Under Asynchronous Switching and Its Application

**Wenqian Xie**, Kaibo Shi and Shouming Zhong  
Zhejiang Gongshang University, China

15:00-15:15

**RA0278A**

An Adaptive Activation Transfer Learning Approach for Fault Diagnosis of Motion Control System in Rotating Machinery

**Dr. Yongyi Chen**, Dan Zhang  
Zhejiang University of Technology, China

15:15-15:30

**RA0249**

Optimal Power Regulating for Wind Turbine with LQR and Disturbance Accommodation Pitch Control

**Haoyuan Wen**, Yajuan Liu, S.M. Lee and Ju H. Park  
North China Electric Power University, China

15:30-15:45

# Special Session 5

## Advanced Fluid Power Transmission and Control

### 先进流体传动与控制

Chair: Yixuan Wang, Beihang University, China

Beijing Time: 16:00-17:00  
22nd Apr. 2023

The 16th Conference Room (B1 Floor)  
B1 层第十六会议室

**RA0243**

Nonlinear Control of Flexible Bevel-tip Needles in LPV System for Plane Path Following

**Hanwen Zhang**, Zhi Qi and Hui Zhang

16:00-16:15

Beihang University, China

**RA0397**

Reliability Analysis and Cloud-aided Health Management for Electric Locomotive Vehicle Circuit Board

Bing Shang, **Zhuoyun Li** and Zhi Qi

16:15-16:30

CRRC Dalian R&D Co. LTD

**RA0263**

Wheel Pressure Estimation of Hydraulic Integrated Braking System by Fusion Model

**Lingtao Wei**, Xiangyu Wang and Liang Li

16:30-16:45

Tsinghua University, China

**RA0274**

Research on Backstepping Control of Flexible Joint Manipulator with State Constraint

**Dr. Yong-Li Yan**, Li Ding, Teng Ren and Fu-Cai Liu

16:45-17:00

Beihang University, China

# Special Session 6

## Space Intelligence Dexterous Operation

### 空间智能灵巧操作

Chair: Xin Li, Beijing Institute of Spacecraft System Engineering, China

Beijing Time: 16:00-17:30  
22nd Apr. 2023

The 8th Conference Room (B1 Floor)  
B1 层第八会议室

<p><b>RA0269</b> 16:00-16:15</p>	<p>A Design for Front Ends in Satellite-Based Binocular SLAM System Based on Multi-Core Digital Signal Processor <b>Yuhang Wu</b>, Luyuan Wang and Bowen Cheng Beijing Institute of Spacecraft System Engineering, China</p>
<p><b>RA0233</b> 16:15-16:30</p>	<p>Learning-Based Optimal Impedance Control for Space Manipulator Contact Tasks <b>Dr. Han Wu</b>, Kaipeng Sun, Qinglei Hu, Yongxia Shi, Jianying Zheng and Jiawen Wang Beihang University, China</p>
<p><b>RA0410</b> 16:30-16:45</p>	<p>Human-Robot Collaboration Based on Gaussian-Mixture Model <b>Jiixin Guo</b>, Luyuan Wang, Jiyang Yu and Weiwei Liu Beijing Institute of Spacecraft System Engineering, China</p>
<p><b>RA0412</b> 16:45-17:00</p>	<p>Optimized Design of On-Board Storage System Based on CFDP Protocol <b>Xin Li</b>, Weiwei Liu, Yuehua Niu and Jiyang Yu Beijing Institute of Spacecraft System Engineering, China</p>
<p><b>RA0294</b> 17:00-17:15</p>	<p>Task Allocation Method for Multi-unmanned Marine Vehicle Cooperative Formation Jie Wu, <b>Zikang Hao</b>, Zhenning Liu and Yanyan Li Wuhan University of Technology, China</p>
<p><b>RA0321</b> 17:15-17:30</p>	<p>Progressive Rapidly-exploring Random Tree for Global Path Planning of Robots <b>Miaomiao Tian</b> and Jiyang Yu Beijing Institute of Spacecraft System Engineering, China</p>



# Session 7

## Object Detection and Machine Vision

### 物体检测与机器视觉

Chair: Shenshen Luan, Beijing Institute of Spacecraft System Engineering, China

Beijing Time: 16:00-17:30  
22nd Apr. 2023

The 6th Conference Room (B1 Floor)  
B1 层第六会议室

**RA0381** Convolutional Radon Transformation Method for Sparse Collective Recognizing  
**Bowen Cheng**, Dan Wang, Jiayang Niu, Xiaoda Li and Shenshen Luan  
16:00-16:15 Beijing Institute of Spacecraft System Engineering, China

**RA0315** Parallel and Accelerated Feature Extraction of Manipulative Scene of Space Dim Target  
Jiyang Yu, **Dan Huang**, Jinyang Li, Wenjie Li, Xiangjie Wang and Xiaolong Shi  
16:15-16:30 China Research and Development Academy of Machinery Equipment, China

**RA0330** Vision-Based High-Precision Assembly with Force Feedback  
**Yurou Chen**, Jiyang Yu, Liancheng Shen, Zhenyang Lin and Zhiyong Liu  
16:30-16:45 China Institute of Automation, Chinese Academy of Sciences, China

**RA0360** Cascade Aggregation Network for Ship Instance Segmentation  
**Dr. Yuxin Sun**, Li Su, Shouzheng Yuan and Hao Meng  
16:45-17:00 Harbin Engineering University, China

**RA0375** On the Optimal Path Following for an Autonomous Vehicle via Nonlinear Model Predictive Control  
Jun-Ting Li, **Prof. Chih-Keng Chen** and Hongbin Ren  
17:00-17:15 National Taipei University of Technology, China

**RA0358** IA\*QB: An Efficient Trajectory Planning Approach for the Automatic Berthing of Unmanned Surface Vessel  
17:15-17:30 **Shouzheng Yuan**, Zhilin Liu, Yuxin Sun, Simeng Song and Zhongxin Wang  
Harbin Engineering University, China

# Online Sessions

Beijing, China | April 23, 2023

中国, 北京 | 2023 年 4 月 23 日

# Special Session 1B

## Control of Advanced Robotic and Mechatronic Systems

### 先进机器人及机电系统控制

Chair: Tong Yang, Nankai University, China

Beijing Time: 13:00-14:30  
23rd Apr. 2023

Zoom ID: 860 1556 7851  
Link: <https://us02web.zoom.us/j/86015567851>

**RA0335**

13:00-13:15

Automation of Banana Fiber for Improving Mechanical Properties of Concrete  
**Marcelo Miguel De la Cruz-Calderon**, Cesar Elmer Taboada-Perez, Axel Anyelo Luque-Saico, Juan Jose Bullon-Rosas  
Universidad Continental, Peru

**RA0142**

13:15-13:30

Dynamic Modeling and Validation of Soft Robotic Snake Locomotion  
**Dimuthu Kodippili Arachchige**, Dulanjana Perera, Sanjaya Mallikarachchi, Iyad Kanj, Yue Chen, Hunter Gilbert and Isuru Godage  
DePaul University, USA

**RA0250**

13:30-13:45

Modeling and Implementation of a 3 Degrees of Freedom Delta Robot through Gestalt Framework  
**Luz Condori Pacori** and Nilton Anchayhua Arestegui  
San Pablo Catholic University, Peru

**RA0298**

13:45-14:00

Cuckoo Search Algorithm Optimization of Holt-Winter Method for Distribution Transformer Load Forecasting  
Ciprian Charles Mauricio and **Conrado Ostia Jr**  
Mapua University, Philippines

**RA0240**

14:00-14:15

Research on Arrhythmia Classification Based on Domain Adaptation  
**Luyao Chao**, Zhanbo Li and Hongpo Zhang  
Zhengzhou University, China

**RA0299**

14:15-14:30

Motor Fault Diagnosis of a Brushless DC Motor using Fast Kurtogram on Convolutional Neural Network  
**Joselito Flores Jr** and Conrado Ostia Jr  
Mapua University, Philippines

**RA0267**

14:30-14:45

Adaptive Fuzzy Fault-Tolerant Attitude Control for Unmanned Aerial Vehicle  
**Dr. Zhilong Yu**, Yinghui Li, Binbin Pei, Wenfeng Xu, Zehong Dong and Maolong Lv  
Air Force Engineering University, China

# Special Session 2

## Intelligent and Sustainable Solutions for Liveable Cities

### 宜居城市的智能和可持续解决方案

Chair: Andrew Keong Ng, Singapore Institute of Technology, Singapore

Beijing Time: 13:00-14:30  
23rd Apr. 2023

Zoom ID: 831 9464 1295  
Link: <https://us02web.zoom.us/j/83194641295>

Design of a Control System for Monitoring Overflows for Water Catchment Infrastructure in Rural Areas

**RA0365**

Erick Ramiro Segovia Gutarra, **Maycol Alberth Inga Huanay**, Jhon Jefferson Rojas Murillo, Giovene Perez Campomanes, Sario Angel Chamorro Quijano and Diego Cajachagua Guerreros  
Universidad Continental, Peru

13:00-13:15

**RA0132**

Decentralized Data Collection via Swarm Contracts: Study on Crowd-Sourced Google Maps  
**Sanjaya Mallikarachchi**, Bonnie Ho, Oshani Seneviratne, Iyad Kanj and Isuru Godage  
DePaul University, USA

13:15-13:30

**RA0270**

Brushless DC Motor Fault Classification using Support Vector Machine Algorithm with Discrete Wavelet Transform Feature Extraction  
**Jeffrey Casem**, Giemer Marey Golecruz and Conrado Ostia Jr  
Mapua University, Philippines

13:30-13:45

**RA0371**

Intelligent Ventilation Management System of Laboratory Based on Fuzzy Logic  
**Wei Zhou**, Ziqi Zeng and Shijie Bao  
Xiamen University of Technology, China

13:45-14:00

**RA0277**

Design, Development and Implementation of an Effective and Efficient Emergency Third Rail Fishplate Joint Clamp  
**Shawn Jun Jie Pang** and Andrew Keong Ng  
Singapore Institute of Technology, Singapore

14:00-14:15

**RA0339**

Image Enhancement and Detection of Courier Slips Based on Affine Transform  
**Xin Wang**, Fan Xu, Yan Ye and Yishen Xu  
Soochow University, China

14:15-14:30

**RA0336**

Learning Sufficient Correlations Among Points for 3D Non-rigid Point Cloud Registration  
**Chen Li**, Anshun Xue, Chongkun Xia, Houde Liu and Bin Liang  
Tsinghua University, China

14:30-14:45

# Special Session 1C

## Control of Advanced Robotic and Mechatronic Systems

### 先进机器人及机电系统控制

Chair: Henglai Wei, Nanyang Technological University, Singapore

Beijing Time: 13:30-15:15  
23rd Apr. 2023

Zoom ID: 850 7469 1857  
Link: <https://us02web.zoom.us/j/85074691857>

**RA0272**

Robotic Arm for Unfastening Screws in Automated Disassembly Process  
**Konkala Manisha, Ananya S Kudaloor**, Dasari Geervani, Kota Sanjeev Sannihith and Shwetha G  
PES University, India

13:30-13:45

**RA001**

An Application of a Set-Valued State Estimator Based on Constrained Zonotopes in GNSS-INS Integration  
**Fawad Farooq Ashraf**  
Centers of Excellence in Science & Applied Technologies, Pakistan

13:45-14:00

**RA0043**

Motion Planning of Dual-Chain Manipulator Based on Artificial Bee Colony Algorithm  
**Dr. Zhenyong Zhou**, Jing Zhao, Ziqiang Zhang and Xiaohui Li  
Beijing University of Technology, China

14:00-14:15

**RA0285**

The Path Integral Motion Planning of the Cable-Driven Segmented Redundant Manipulators  
**Hongji Shang**, Lunfei Liang, Xiaojun Zhu, Bin Lan and Xueqian Wang  
Shenzhen International Graduate School, Tsinghua University, China

14:15-14:30

**RA0369**

Deep Reinforcement Learning-Based Control of Bicycle Robots on Rough Terrain  
**Xianjin Zhu**, Xudong Zheng, Yang Deng, Zhang Chen, Bin Liang and Yu Liu  
Harbin Institute of Technology, China

14:30-14:45

**RA0392**

Analysis of the Performance of an Omnidirectional Bionic Leg  
**Yuze Xu**, Jianzhong Shang, Shanjun Chen, Minghai Xia, Yiming Zhu and Zirong Luo  
National University of Defense Technology, China

14:45-15:00

**RA0399**

Growing Robot Navigation Based on Deep Reinforcement Learning  
**Ahmad Ataka** and Andreas P Sandiwan  
Universitas Gadjah Mada, Indonesia

15:00-15:15

# Special Session 3B

## Autonomous Safety Control in Aerospace Applications

### 航空航天领域中的自主安全控制

Chair: Yongxia Shi, City University of Hong Kong, China

Beijing Time: 13:30-15:30  
23rd Apr. 2023

Zoom ID: 895 1238 6100  
Link: <https://us02web.zoom.us/j/89512386100>

#### RA0356

13:30-13:45

Multi-UAV Path Planning with Collision Avoidance in 3D Environment Based on Improved APF

Xiaojun Wu, **Siyu Wu**, Sheng Yuan, Xiaolong Wang and Yibo Zhou  
Xi'an Jiaotong University, China

#### RA0414

13:45-14:00

Research on Autonomous Decision-Making in Manned/Unmanned Coordinated Air Combat

Xiangming Dou, Guojian Tang, **Aoyu Zheng**, Han Wang, Xiaolong Liang  
Air Force Engineering University, China

#### RA0396

14:00-14:15

Research on the Dynamic Obstacle Avoidance Method of Unmanned Surface Vehicle Based on RVO

**Sujun Zhang**, Chenfei Wu and Yulong Wang  
Shanghai University, China

#### RA0383

14:15-14:30

Accurate Localization for Indoor and Outdoor Scenario by GPS and UWB Fusion

Jie Luo, **Zhengshuai Yin**, Linqiu Gui and Xu Yang  
Wuhan University of Technology, China

#### RA0291

14:30-14:45

Learning Pre-Grasp Manipulation of Multiple Flat Target Objects in Clutter

**Dr. Liangdong Wu**, Jiayi Wu, Yurou Chen, Zhengwei Li and Zhiyong Liu  
University of Chinese Academy of Sciences, China

#### RA0300

14:45-15:00

Hierarchical Attention-Based Fully Convolutional Network for Satellite Cloud Classification and Detection

**Dan Jin** and Mingqiang Li  
Information Science Academy of China Electronics Technology Group Corporation, China

#### RA0245

15:00-15:15

Flight Path Simulation of Maneuverable Unmanned Aerial Vehicles Based on Kalman Filter

**Wenda Yang**, Xiangxi Wen, Maolong Lv and Minggong Wu  
Air Force Engineering University, China

#### RA0211

15:15-15:30

A Specified-Time Cooperative Optimal Control Approach to Unmanned Aerial Vehicle Swarms

**Dr. Ao Wu**, Rennong Yang, Huanyu Li and Maolong Lv  
Air Force Engineering University, China

# Special Session 4B

## Intelligent Perception and Control of Networked Motion Control Systems

### 网络化运动控制系统智能感知与控制

Chair: Jun Cheng, Guangxi Normal University, China

Beijing Time: 15:45-17:45  
23rd Apr. 2023

Zoom ID: 850 7469 1857  
Link: <https://us02web.zoom.us/j/85074691857>

**RA0280** Tool Path Interpolation Method in Five-Axis CNC Machining  
**Wang Jinjie**, Geng Cong, Geng Dapeng and Zhang Han  
15:45-16:00 Shenyang Jianzhu University, China

**RA0287** Energy and Time-efficient Trajectory Planning and Geometric Control for Quadrotor Waypoints Flight  
**Ziniu Wu** and Ruonan Zhang  
16:15-16:30 University of Bristol, UK

**RA0219** Youla Parameterized Control Against Line Spectrum Vibration with an Adaptive Forgetting Factor Improved by A Genetic Algorithm  
Qimin Li, Mengjing Li, Zhentan Li, Jiahao Zhu, Jinglei Zhao, Ruqing Bai, Xueping Li, Jun Luo, Huayan Pu and **Dr. Shujin Yuan**  
16:30-16:45 Chongqing University, China

**RA0254** Path Planning of Autonomous Driving Based on Quadratic Optimization  
**Yi Wei** and Haiqin Xu  
16:45-17:00 Donghua University, China

**RA0372** Optimal Bandwidth Selection for DENCLUE Algorithm  
**Hao Wang**  
17:00-17:15 Ratidar Technologies LLC, China

**RA0122** Emergency Braking Control in 3D Overhead Cranes using a switching PD-Fuzzy Controller  
**Arup Deka** and Sandeep Reddy Basireddy  
17:15-17:30 Indian Institute of Technology, India

**RA0406** Fault Prediction Model of Wind Power Pitch System Based on BP Neural Network  
**Zhenhui Ou**, Dingci Lin and **Prof. Jie Huang**  
17:30-17:45 Fuzhou University, China

## Session 8

### The Application of Intelligent Image Processing in Modern Electronic Information Systems

#### 智能图像处理在现代电子信息系统中的应用

Chair: Eugenia Zhuo, University of Santo Tomas, Philippines

Beijing Time: 15:45-17:15  
23rd Apr. 2023

Zoom ID: 895 1238 6100  
Link: <https://us02web.zoom.us/j/89512386100>

**RA0062** Evaluation of Older Adults' Preference Factors for Serious Games  
Bao-Yi Zhang and **Yi-Ming Gao**  
15:45-16:00 Xiamen University of Technology, China

**RA0380** A Novel Distributed Algorithm to Seek GNE for Aggregative Games via Primal-Dual Proximal Gradient  
16:00-16:15 **Dr. Zhe Li**, Huaqing Li, Liang Ran, Songyang Li, Lüming Fan, Lifeng Zheng and Jun Li  
Southwest University, China

**RA0295** Global Information Attention Based Dual-Pathway Network for Oxidized Slag Segmentation of Metal Ingot Images  
16:15-16:30 **Ao Zhang**, Degang Xu, Xuming Liu and Jie Wu  
Central South University, China

**RA0072** Analyzing the Attractiveness Factors of Health Wearables for Older Adults using EGM and Quantification Theory Type I  
16:30-16:45 Bao-Yi Zhang, **Han-Xuan Liu** and Ying-Jie Song  
Xiamen University of Technology, China

**RA0224** Review on the Research Status of Intelligent Level Classification  
16:45-17:00 **Yubing Wang**, Weijia Wang, Boyang Zhang, Jingye Peng and Han Luo  
Beijing Blue Sky Innovation Center for Frontier Science, China

**RA0112** Design Research on Electronic Sphygmomanometer for the Elderly Based on Miryoku Engineering  
17:00-17:15 **Xiao-Jie Wu**, Bao-Yi Zhang and Jing-Jing Huang  
Xiamen University of Technology, China



# Closing Ceremony & Awards

闭幕式 & 会议颁奖

(线上)

April 23rd, 18:00-18:20

Zoom ID: 850 7469 1857

Link: <https://us02web.zoom.us/j/85074691857>

## Presenters Index

Presenter's Name	Page	Presenter's Name	Page
<b>A</b>		Jing Chang	20
Andreas P Sandiwan	28	Joselito Flores Jr	26
Ao Wu	29	<b>K</b>	
Ao Zhang	31	Konkala Manisha	28
Aoyu Zheng	29	<b>L</b>	
Arup Deka	30	Liangdong Wu	29
Ananya S Kudaloor	28	Lingtao Wei	22
<b>B</b>		Longfei Yue	20
Bowen Cheng	23	Lunfei Liang	28
<b>C</b>		Luyao Chao	26
Chen Li	22	Luz Condori Pacori	26
Chih-Keng Chen	24	<b>M</b>	
Chuhan Zhou	21	Marcelo Miguel De la Cruz Calderon	26
Conrado Ostia Jr	26	Maycol Alberth Inga Huanay	27
<b>D</b>		Menghua Zhang	19
Dan Huang	24	Miaomiao Tian	23
Dan Jin	29	<b>N</b>	
Dan Zhang	21	Ning Wang	21
Dimuthu Kodippili Arachchige	26	<b>P</b>	
<b>H</b>		Pei Yin	19
Han Wu	23	Pengcheng Lin	19
Hanwen Zhang	19/22	<b>S</b>	
Han-Xuan Liu	31	Sanjaya Mallikarachchi	26
Hao Wang	30	Shawn Jun Jie Pang	27
Haoran Han	20	Shouzheng Yuan	27
Haoyuan Wen	21	Shujin Yuan	30
<b>F</b>		Siyu Wu	29
Fawad Farooq Ashraf	28	Sujun Zhang	29
<b>J</b>			
Jeffrey Casem	27		

<b>Presenter's Name</b>	<b>Page</b>	<b>Presenter's Name</b>	<b>Page</b>
<b>W</b>		Yong-Li Yan	22
Wang Jinjie	30	Yongyi Chen	21
Weiwei Liu	23	Yubing Wang	31
Wei Zhou	27	Yuhang Wu	23
Wenda Yang	29	Yurou Chen	24
Wenfei Wang	20	Yuxin Sun	24
Wenjie Lin	21	Yuze Xu	28
Wenqian Xie	21		
		<b>Z</b>	
<b>X</b>		Zhe Li	31
Xianjin Zhu	28	Zhengshuai Yin	29
Xiao-Jie Wu	31	Zhenhui Ou	30
Xin Li	23	Zhenyong Zhou	28
Xin Wang	27	Zhilong Yu	20
Xinwei Chen	19	Zhuoqing Liu	19
		Zhuoyun Li	22
<b>Y</b>		Zikang Hao	23
Yi Wei	30	Ziniu Wu	30
Yi-Ming Gao	31		

