The 13th China-Japan International Workshop on Information Technology and Control Applications, ITCA2020

第十三届中日信息技术与控制应用国际学术研讨会

程序册

Final Program

中国 · 恩施

Enshi · China

September 26-28, 2020

第13届中日信息技术与控制应用国际研讨会

The 13th China-Japan International Workshop on Information Technology and Control Applications (ITCA2020)

中国 · 恩施

ENSHI · CHINA

September 26-28, 2020

主办单位

中国地质大学（武汉）
北京理工大学
东京工科大学

承办单位

中国地质大学（武汉）
湖北民族大学

协办单位

复杂系统先进控制与智能自动化学科创新引智基地

复杂系统先进控制与智能自动化湖北省重点实验室

地球探测智能化技术教育部工程研究中心

智能地质装备湖北省工程技术研究中心

湖北省自动化学会

支持单位

湖北科学技术协会
富士技术出版有限责任公司

会议日期

2020年9月26日-28日

地点

Zoom会议

Organizing Institutes

China University of Geosciences
Beijing Institute of Technology
Tokyo University of Technology

Hosts

China University of Geosciences
Hubei Minzu University

Co-Hosts

Advanced Control and Intelligent Automation for Complex Systems Overseas Expertise Introduction Center for Discipline Innovation

Hubei Key Laboratory of Advanced Control and Intelligent Automation for Complex Systems

Engineering Research Center of Intelligent Technology for Geoexploration, Ministry of Education

Hubei Engineering Research Center of Intelligent Geological Equipment

Hubei Association of Automation

Sponsors

Hubei Association For Science & Technology

Fuji Technology Press Ltd.

Date

September 26-28, 2020

Location

Zoom

第13届中日信息技术与控制应用国际研讨会

The 13th China-Japan International Workshop on Information Technology and Control Applications (ITCA2020)

会议组织 / Organization

总主席 / General Chairs

吴　敏　中国地质大学（武汉）
Min Wu, China University of Geosciences

陈　杰　北京理工大学/同济大学
Jie Chen, Beijing Institute of Technology, Tongji University

大山恭弘　东京工科大学
Yasuhiro Ohyama, Tokyo University of Technology

程序委员会主席 / Program Committee Chairs

曹卫华　中国地质大学（武汉）
Weihua Cao, China University of Geosciences

孙　健　北京理工大学
Jian Sun, Beijing Institute of Technology

佘锦华　东京工科大学
Jinhua She, Tokyo University of Technology

组织委员会主席 / Organizing Committee Chairs

陈略峰　中国地质大学（武汉）
Luefeng Chen, China University of Geosciences

辛　斌　北京理工大学
Bin Xin, Beijing Institute of Technology

亀田裕之　东京工科大学
Hiroyuki Kameda, Tokyo University of Technology

谢坤武　湖北民族大学
Kunwu Xie, Hubei Minzu University

第13届中日信息技术与控制应用国际研讨会

The 13th China-Japan International Workshop on Information Technology and Control Applications (ITCA2020)

会议组织 / Organization

程序委员会委员 / Program Committee Members

安剑奇　中国地质大学（武汉）
Jianqi An, China University of Geosciences

陈　鑫　中国地质大学（武汉）
Xin Chen, China University of Geosciences

戴亚平　北京理工大学
Yaping Dai, Beijing Institute of Technology

董浩斌　中国地质大学（武汉）
Haobin Dong, China University of Geosciences

董凯峰　中国地质大学（武汉）
Kaifeng Dong, China University of Geosciences

方　浩　北京理工大学
Hao Fang, Beijing Institute of Technology

福田敏男　名古屋大学/北京理工大学
Toshio Fukuda, Nagoya University, Beijing Institute of Technology

福岛E. 文彦　东京工科大学
Fumihiko E. Fukushima, Tokyo University of Technology

Krzysztof Galkowski　波兰绿山大学
Krzysztof Galkowski, Uniwersytet Zielonogórski

何　勇　中国地质大学（武汉）
Yong He, China University of Geosciences

廣田薫　东京工业大学
Kaoru Hirota, Tokyo Institute of Technology

Victor Huang　Sage技术资源有限责任公司
Victor Huang, Sage Technology Resources, Inc.

岩崎誠　名古屋工业大学
Makoto Iwasaki, Nagoya Institute of Technology

Andres Kecskemethye　杜伊斯堡-埃森大学
Andres Kecskemethye, University of Duisburg-Essen

川田诚一　日本产业技术学院大学
Seiichi Kawata, Advanced Institute of Industrial Technology

廖晓钟　北京理工大学
Xiaozhong Liao, Beijing Institute of Technology

刘国平　英国南威尔士大学
Guoping Liu, The University of South Wales

刘康志　千叶大学
Kangzhi Liu, Chiba University

刘振焘　中国地质大学（武汉）
Zhentao Liu, China University of Geosciences

刘向东　北京理工大学
Xiangdong Liu, Beijing Institute of Technology

中西要祐　早稻田大学
Yosuke Nakanishi, Waseda University

大西公平　日本庆应义塾大学
Fumihiko E. Fukushima, Keio University

Witold Pedrycz　阿尔伯塔大学
Witold Pedrycz, University of Alberta

彭志红　北京理工大学
Zhihong Peng, Beijing Institute of Technology

Joseph Spencer　利物浦大学
Joseph Spencer, University of Liverpool

施　阳　加拿大维多利亚大学
Yang Shi, University of Victoria

苏春翌　康考迪亚大学
Chunyi Su, Concordia University

寺野隆雄　东京工业大学
Takao Terano, Tokyo Institute of Technology

第13届中日信息技术与控制应用国际研讨会

The 13th China-Japan International Workshop on Information Technology and Control Applications (ITCA2020)

会议组织 / Organization

程序委员会委员 / Program Committee Members

王美玲　北京理工大学
Meiling Wang, Beijing Institute of Technology

王军政　北京理工大学
Junzheng Wang, Beijing Institute of Technology

伍清河　北京理工大学
Qinghe Wu, Beijing Institute of Technology

夏元清　北京理工大学
Yuanqing Xia, Beijing Institute of Technology

忻　欣　日本冈山县立大学
Xin Xin, Okayama Prefectural University

熊永华　中国地质大学（武汉）
Yonghua Xiong, China University of Geosciences

徐　立　日本秋田县立大学
Li Xu, Akita Prefectural University

横山隆一　早稻田大学
Ryuichi Yokoyama, Waseda University

张昌凡　湖南工业大学
Changfan Zhang, Hubei Minzu University

宗小峰　中国地质大学（武汉）
Xiaofeng Zong, China University of Geosciences

孙先波　湖北民族大学
Xianbo Sun, Hubei Minzu University

会议一览 (Program at a Glance)

2020年09月27日 September 27 (Sunday)	2020年09月28日 September 28 (Monday)	
08:30 - 12:00 先进控制与智能自动化研讨会 Pre-Workshop on Advance Control and Intelligent Automation 湖北民族大学 Hubei Minzu University	开幕式 08:30 - 09:00 Opening Ceremony Zoom ID: 97436597905 Password: itca20	
	大会报告 09:00 - 10:10 Plenary Lectures Zoom ID: 97436597905 Password: itca20	
	茶歇 10:10 - 10:30 Tea Break	
	大会报告 10:30 - 12:00 Plenary Lectures Zoom ID: 97436597905 Password: itca20	
	午餐/休息 12:00 - 13:30 Lunch	
14:30 - 18:30 自动化与人工智能教育专题研讨会 Panel Discussion on Automation and Artificial Intelligent Education 湖北民族大学 Hubei Minzu University	13:30 - 15:30 分组报告 Oral Sessions	Session A-1 Zoom ID: 86515324150 Password: itca20
		Session B-1 Zoom ID: 85797790328 Password: itca20
		Session C-1 Zoom ID: 79562906419 Password: itca20
	茶歇 15:30 - 15:50 Tea Break	
	15:50 - 18:10 分组报告 Oral Sessions	Session A-2 Zoom ID: 86515324150 Password: itca20
		Session B-2 Zoom ID: 85797790328 Password: itca20
		Session C-2 Zoom ID: 79562906419 Password: itca20
	闭幕式 18:10 - 18:30 Closing Ceremony Zoom ID: 85797790328 Password: itca20	

会议日程 I (Schedule I)

时间：2020年9月27日　　地点：湖北民族大学
Date: September 27, 2020　　Location: Hubei Minzu University

先进控制与智能自动化研讨会
Pre-Workshop on Advance Control and Intelligent Automation

08:30 - 12:00	主持人：谢坤武 教授，湖北民族大学 Chair: Kunwu Xie, Hubei Minzu University
08:30 - 09:15	地球探测智能化技术前沿研究 **Frontier Research of Intelligent Technology for Geo-Exploration** 吴　敏, 中国地质大学（武汉） Min Wu, China University of Geosciences, China
09:15 - 10:00	制造过程自动化与智能化 **Manufacturing Process Automation and Intelligence** 曹卫华, 中国地质大学（武汉） Weihua Cao, China University of Geosciences, China
10:00 - 10:30	**茶歇 / Tea Break**
10:30 - 11:15	情感计算与情感机器人 **Affective Computing and Emotional Robots** 陈略峰, 中国地质大学（武汉） Luefeng Chen, China University of Geosciences, China
11:15 - 12:00	**讨论 / Discussion**

自动化与人工智能教育专题讨论会
Panel Discussion on Automation and Artificial Intelligent Education

14:30 - 18:30	主持人：孙先波 副教授，湖北民族大学 Chair: Xianbo Sun, Hubei Minzu University

会议日程 II (Schedule II)

时间：2020年9月28日　　地点：Zoom会议
Date: September 28, 2020　　Location: Zoom

08:30 - 09:00	**开幕式 / Opening Ceremony** 主持人：曹卫华 教授，中国地质大学（武汉） Chair: Weihua Cao, China University of Geosciences Zoom ID: **97436597905**　　Password: **itca20**
介绍嘉宾 / Introducing Guests	
嘉宾致辞 **Guest Speech**	赖旭龙　教授、副校长，中国地质大学（武汉） Xulong Lai, China University of Geosciences
	陈　杰　教授、校长，同济大学 Jie Chen, Tongji University
	大山恭弘　教授、校长，东京工科大学 Yasuhiro Ohyama, Tokyo University of Technology
	福田敏男 教授、IEEE总主席，名古屋大学/北京理工大学 Toshio Fukuda, Nagoya University, Beijing Institute of Technology
	陈国祥　部长，湖北省科学技术协会学会部 Guoxiang Chen, Hubei Association For Science & Technology
	顿祖义　教授、校长，湖北民族大学 Zuyi Dun, Hubei Minzu University
09:00 - 10:10	**大会报告 I / Plenary Lectures I** 主持人：佘锦华 教授，东京工科大学 Chair: Jinhua She, Tokyo University of Technology Zoom ID: **97436597905**　　Password: **itca20**
09:00 - 09:35	**Multiview Rule-Based Modeling and Granular Aggregation** Witold Pedrycz, 加拿大阿尔伯塔大学 Witold Pedrycz, University of Alberta, Canada
09:35 - 10:10	**Modeling and Identification of Strain Wave Gearing for Motion Control Applications to Precision Positioning Devices** 岩崎誠, 日本名古屋工业大学 Makoto Iwasaki, Nagoya Institute of Technology, Japan
10:10 - 10:30	**茶歇 / Tea Break**

10:30 - 12:00	**大会报告 II / Plenary Lectures II** 主持人：孙健 教授，北京理工大学 Chair: Jian Sun, Beijing Institute of Technology	
	Zoom ID: **97436597905**	Password: **itca20**
10:30 - 11:00	**Development Direction of Human Coexistence Robot Partner Based on Smart Device** Jinseok WOO, 日本东京工科大学 Jinseok WOO, Tokyo University of Technology, Japan	
11:00 - 11:30	**Accelerated First-Order Distributed Method for Nash Equilibria of Convex-Concave Bilinear Two-Network Zero-Sum Games** 曾宪琳, 北京理工大学 Xianlin Zeng, Beijing Institute of Technology, China	
11:30 - 12:00	**Technology and Application of Intelligent Humanoid Robot System** 陈 鑫, 中国地质大学（武汉） Xin Chen, China University of Geosciences, China	
12:00 - 13:30	**午餐休息 / Lunch**	
13:30 - 15:30	**口头报告 I / Oral Session I**	
	Session A-1: Applications of Advanced Control Theory Chair: Chuanke Zhang	Zoom ID: **86515324150** Password: **itca20**
13:30 - 13:50	**Vibration Suppression Based on Input Shaping and Adaptive Model Following Control** Lulu Wu, Jinhua She, Chuanke Zhang, Zhentao Liu	
13:50 - 14:10	**Trajectory Azimuth Control Based on Equivalent-Input-Disturbance Approach for Directional Drilling Process** Zhen Cai, Xuzhi Lai, Min Wu, Chengda Lu, Luefeng Chen	
14:10 - 14:30	**Position Control of Machine Tool Moving Axis Based on Sliding Mode Control** Sanqiu Liu, Wangyong He, Haogui Li	
14:30 - 14:50	**Output Stabilization for Wind Power System Using Equivalent-Input-Disturbance Approach** Junyang Shen, Jinhua She	

14:50 - 15:10	**Asymptotic Stabilization for a Class of Linear Fractional-Order Composite Systems** Zhang Zhe, Toshimitsu Ushio, Zhang Jing, Liu Feng , Can Ding	
15:10 - 15:30	**Speed-Sensorless Control of IPMSM Based on Novel Nonsingular Fast Terminal Sliding Mode Observer and Fractional-Order Software Phase-Locked Loop** Kaihui Zhao, Ruirui Zhou, Jinhua She , Aojie Leng, Wangke Dai, Gang Huang	
	Session B-1: Deep Learning and Affective Computing Chair: Zhen-Tao Liu	Zoom ID: **85797790328** Password: **itca20**
13:30 - 13:50	**A Tomato Disease Recognition System Based on Image Enhancement and Deep Learning** Yonghua Xiong, Longfei Liang	
13:50 - 14:10	**Speech Emotion Recognition Based on Improved Synthetic Minority Over-Sampling Technique** Zhen-Tao Liu, Bao-Han Wu, Peng Xiao, Jin-Meng Xu	
14:10 - 14:30	**Feasibility Architecture for Processing Multimodal Signal for a Robot Control System** Motohiro Akikawa, Masayuki Yamamura	
14:30 - 14:50	**Car Body Precision Monitoring and Analysis Based on Big Data** Yixin Yang, Jianjun Gao, Yiping Feng, Konghui Guo	
14:50 - 15:10	**Reconstruction Method for Missing Measurement Data of High-Speed Train Using Generative Adversarial Network** Changfan Zhang, Hongrun Chen, Jing He	
15:10 - 15:30	**Sparse Representation Based Googlenet for Indoor Scene Recognition** Wenhao Duan, Luefeng Chen, Min Li, Min Wu, Pingping Zhang, Kuanlin Wang, Witold Pedrycz	
	Session C-1: Network System and Computer Simulation Chair: Chao Gan	Zoom ID: **79562906419** Password: **itca20**
13:30 - 13:50	**Numerical Simulation of Metal-Free Water Cannon** Tomomasa Ohkubo, Ei-ichi Matsunaga, Yuji Sato	

13:50 - 14:10	**Computer Simulation of Pumping Cavity for Solar-Pumped Laser** Hayato Koshiji, Tomomasa Ohkubo, Takeru Nagai, Takumi Shimoyama, Ei-ichi Matsunaga, Yuji Sato, Thanh-hung Dinh	
14:10 - 14:30	**Multi-Robot Mobile Platform Design Based on Optimized Depth Q Network** Feng Liu, Chang Chen, Zhihua Li, Zhi-Hong Guan	
14:30 - 14:50	**Analog Realization of Fractional-Order Capacitor and Inductor Defined by the Caputo-Fabrizio Derivative** Manjie Ran, Xiaozhong Liao, Da Lin, Ruocen Yang	
14:50 - 15:10	**Design and Implementation of Multi-Function Servo Experiment System Based on High-Speed Bus** Yonghua Xiong, Ke Li, Zhentao Liu, Jinhua She, Min Wu	
15:10 - 15:30	**An Improved Proxy Re-Encryption Based Identity Combined with AES Storage Scheme in Cloud** Zhenwu Xu, Jinan Shen, Fang Liang, Yingjie Chen	
15:30 - 15:50	**茶歇 / Tea Break**	
15:50 - 18:10	**口头报告 II / Oral Session II**	
	Session A-2: Intelligent Robust Modeling & Control Chair: Chengda Lu	Zoom ID: **86515324150** Password: **itca20**
15:50 - 16:10	**An Intelligent Compensating Method for MPC-Based Deviation Correction with Stratum Uncertainty in Vertical Drilling Process** Dian Zhang, Min Wu, Chengda Lu, Luefeng Chen, Weihua Cao, Jie Hu	
16:10 - 16:30	**Research on the Single-Phase Photovoltaic Grid-connected Inverter Based on Fuzzy Neural Network** Shenping Xiao, Zhouquan Ou, Junming Peng, Yang Zhang	
16:30 - 16:50	**Repetitive Control Based on Multi-Stage PSO Algorithm with Variable Interval for T-S Fuzzy Systems** Yibing Wang, Manli Zhang, Min Wu, Luefeng Chen	
16:50 - 17:10	**Neural Network-Based Optimal Control for a Class of Unknown Nonlinear System via Output Information** Can Ding, Jing Zhang, Yingjie Zhang, Zhe Zhang, Feng Liu	

17:10 - 17:30	**Path Planning of Mobile Robot in Complex Environment Based on Genetic Algorithm and Improved Artificial Potential Field Method** Feng Liu, Hualing He, Zhihua Li, Zhi-Hong Guan	
17:30 - 17:50	**A Customer Experience Mapping for Business Innovation Case Description** Masaaki Kunigami, Takamasa Kikuchi, Hiroshi Takahashi, Takao Terano	
	Session B-2: Image, Acoustic, Speech & Signal Processing Chair: Xiao-Bo Liu	Zoom ID: **85797790328** Password: **itca20**
15:50 - 16:10	**Multi-feature Fusion Based Deep Forest for Hyperspectral Image Classification** Peng Liu, Xiao-Bo Liu, Zhi-Hua Cai, Yu-Lin Qiao	
16:10 - 16:30	**Demagnetization Fault Diagnosis of Permanent Magnet Synchronous Motor Considering Inductance Disturbance** Fan Xiao, Jing He, Miao Y Zhang	
16:30 - 16:50	**An Improved Approach for Detection and Pose Estimation of Texture-less Objects** Jian Peng, Ya Su	
16:50 - 17:10	**Positioning Method of Dulcimer Keys Based on Binocular Vision** De Tang, Ziying Zhang, Xin Chen, Zhe Xiao, Mengxi Qin	
17:10 - 17:30	**Disaster Relation Diagram Based on a Disaster Causation Database Extracted from Japanese Newspaper Articles** Fumihiro Sakahira, U Hiroi	
17:30 - 17:50	**Control of Hydraulic Sea floor Drill Rig Magazines Based on Finite-State Machine** Junxiang Wang, Hao Sun, Zhengdong Zhu, Ying Zhou, Lan Jiang, Li Yuan	
	Session C-2: Distributed Control Methods Chair: Xianlin Zeng	Zoom ID: **79562906419** Password: **itca20**
15:50 - 16:10	**Distributed Consensus Control for General Linear Multi-Agent Systems via a Dynamic Event-Triggered Strategy** Yifei Li, Xiangdong Liu, Changkun Du, Haikuo Liu, Pingli Lu, Ning Dong	
16:10 - 16:30	**Distributed Dynamic Event-Triggered Output Tracking for Heterogeneous Multi-Agent Systems** Changkun Du, Haikuo Liu, Yougang Bian, Pingli Lu, Xiangdong Liu	

16:30 - 16:50	**Distributed Output Feedback Consensus Control of Multiple Lur'e Systems Based on Event-Triggered Mechanism** Jianjun Sun, Haikuo Liu, Changkun Du, Xiangdong Liu, Zhen Chen, Pingli Lu
16:50 - 17:10	**Uncovering Users' Decisions through Serious Game Playing with A Formal Description Method** Akinobu Sakata, Takamasa Kikuchi, Ryuichi Okumura, Masaaki Kunigami, Atsushi Yoshikawa, Masayuki Yamamura, Takao Terano
17:10 - 17:30	**A Controller for Quantized Systems under DoS Attacks with UDP-Like Protocol** Wenjie Liu, Jian Sun, Jie Chen
17:30 - 17:50	**Attack Detection against Stealthy FDI Attacks in Cyber-Physical Systems: A Stochastic Coding Detection Scheme** Haibin Guo, Jian Sun
17:50 - 18:10	**Analyzing Two Ways of Interdisciplinary Research; Individual Interdisciplinary Research and Collaborative Interdisciplinary Research** Masanori Fujita, Takato Okudo, Takao Terano, Hiromi Nagane
18:10 - 18:30	**闭幕式** / Closing Ceremony 主持人：陈略峰 副教授，中国地质大学（武汉） Chair: Luefeng Chen, China University of Geosciences
	Zoom ID: **85797790328** Password: **itca20**

Multiview Rule-Based Modeling and Granular Aggregation

Witold Pedrycz
University of Alberta, Canada
2020.09.28

Abstract: Multiview models, as the name stipulates, are models describing a real-world system observed from different points of view. In establishing such individual perspectives, we typically engage locally available features (attributes, input variables). When considered together, a collection of multiview models has to be aggregated. Multiview models also arise in the presence of data coming with a massive number of variables when building a monolithic model involving all attributes is neither feasible nor computationally sound.

We formulate and discuss these two categories of scenarios by focusing on fuzzy rule-based architectures. An important task when building an aggregate of multiview models is to endow the overall global model with a sound measure of quality using which one can efficiently assess the relevance of the individual results produced by the rule-based models as well as establish the quality of the overall fusion. We advocate that the quality of the results can be quantified in terms of some information granule. In the two scenarios outlined above, the family of multiview models is aggregated with the use of the augmented principle of justifiable granularity -one of the fundamentals of Granular Computing. The related optimization criteria of coverage and specificity are discussed along with the associated optimization process. The emergence of type-2 information granules is also shown.

Witold Pedrycz (IEEE Fellow, 1998) is Professor and Canada Research Chair (CRC) in Computational Intelligence in the Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada. He is also with the Systems Research Institute of the Polish Academy of Sciences, Warsaw, Poland. In 2009 Dr. Pedrycz was elected a foreign member of the Polish Academy of Sciences. In 2012 he was elected a Fellow of the Royal Society of Canada. In 2007 he received a prestigious Norbert Wiener award from the IEEE Systems, Man, and Cybernetics Society. He is a recipient of the IEEE Canada Computer Engineering Medal, a Cajastur Prize for Soft Computing from the European Centre for Soft Computing, a Killam Prize, a Fuzzy Pioneer Award from the IEEE Computational Intelligence Society, and 2019 Meritorious Service Award from the IEEE Systems Man and Cybernetics Society.

His main research directions involve Computational Intelligence, fuzzy modeling and Granular Computing, knowledge discovery and data science, pattern recognition, data science, knowledge-based neural networks, and control engineering. He has published numerous papers in these areas; the current h-index is 114 (Google Scholar) and 87 on the list *top-h scientists for computer science and electronics* http://www.guide2research.com/scientists. He is also an author of 21 research monographs and edited volumes covering various aspects of Computational Intelligence, data mining, and Software Engineering.

Dr. Pedrycz is vigorously involved in editorial activities. He is an Editor-in-Chief of ***Information Sciences***, Editor-in-Chief of ***WIREs Data Mining and Knowledge Discovery*** (Wiley), and Co-editor-in-Chief of ***Int. J. of Granular Computing*** (Springer) and ***J. of Data Information and Management*** (Springer). He serves on an Advisory Board of ***IEEE Transactions on Fuzzy Systems*** and is a member of a number of editorial boards of international journals.

Modeling and Identification of Strain Wave Gearing for Motion Control Applications to Precision Positioning Devices

Makoto Iwasaki
Nagoya Institute of Technology, Japan
2020.09.28

Abstract: The invited speech presents a practical motion controller design technique for precision positioning devices including strain wave gearing, e.g. industrial multi-axis robots. Since HarmonicDrive® gears (HDGs), a typical strain wave gearing, inherently possess nonlinear properties, such as Angular Transmission Errors (ATEs), nonlinear stiffness, nonlinear friction etc., due to structural errors and flexibility in the mechanisms, the ideal positioning accuracy corresponding to the apparent resolution cannot be essentially attained at the output of gearing in the devices. In addition, mechanisms with HDGs generally excite resonant vibrations due to the periodical disturbance by ATEs, especially in the condition that the frequency of synchronous components of ATE corresponds to the critical mechanical resonant frequency. This speech, therefore, focuses on the accurate settling and vibration suppression in positioning, in order to improve the performance deteriorations by applying several control approaches, e.g. a model-based feedforward control manner, and adaptive/robust feedback control manners. In the speech, at first, an approach toward modeling and identification of the ATEs is presented to achieve and apply the precise mathematical models to the motion controller design. Following to the accurate mathematical modeling, several motion controller design approaches are practically presented: a model-based feedforward compensation to improve the settling performance in the positioning, an adaptive variable notch filter design as a feedback compensation to effectively suppress the mechanical vibration, and an H_inf controller design to boost the robust capability. The proposed approaches have been applied to precision motion control of actual devices as servo actuators, and verified through numerical simulations and experiments.

Makoto Iwasaki received the B.S., M.S., and Dr. Eng. degrees in electrical and computer engineering from Nagoya Institute of Technology, Nagoya, Japan, in 1986, 1988, and 1991, respectively. Since 1991, he has been with the Department of Computer Science and Engineering, Nagoya Institute of Technology, where he is currently a Professor at the Department of Electrical and Mechanical Engineering. As professional contributions of the IEEE, he has been an AdCom member of IES in term of 2010 to 2019, a Technical Editor for IEEE/ASME TMech from 2010 to 2014, an Associate Editor for IEEE TIE since 2014, a Management Committee member of IEEE/ASME TMech (Secretary in 2016 and Treasurer in 2017), a Co-Editors-in-Chief for IEEE TIE since 2016, a Vice President for Planning and Development in term of 2018 to 2021, respectively. He is IEEE fellow class 2015 for "contributions to fast and precise positioning in motion controller design". He has received the Best Paper Award of Trans of IEE Japan in 2013, the Best Paper Award of Fanuc FA Robot Foundation in 2011, the Technical Development Award of IEE Japan in 2017, the Nagamori Awards in 2017, the Ichimura Prize in Industry for Excellent Achievement of Ichimura Foundation for New Technology in 2018, the Technology Award of the Japan Society for Precision Engineering in 2018, and the Commendation for Science and Technology by the Japanese Minister of Education in 2019, respectively. His current research interests are the applications of control theories to linear/nonlinear modeling and precision positioning, through various collaborative research activities with industries.

Development Direction of Human Coexistence Robot Partner Based on Smart Device

Jinseok WOO
Tokyo University of Technology, Japan
2020.09.28

Abstract: Social isolation can cause problems on human both mentally and physically. In particular, the isolation of the elderly causes serious problems such as lonely death. However, social participation can lead to healthier lives by reducing isolation. Many technologies are being developed to reduce social isolation and loneliness. Accordingly, we considered to use robot partner in order to prevent social isolation. In this paper, we explain the current state about our development of robot partner, and we discuss development direction of robot. First, we show our robot partner system. Next, we explain the modular structured systems in order to develop robot partner system. Finally, we show several examples of the robot system, and discuss the applicability of proposed system.

Jinseok Woo graduated from the Kumoh National Institute of Technology, Republic of Korea in 2009, and received degree of master of engineering from Tokyo Metropolitan University, Japan in 2011. He has been received degree of doctor of engineering from Tokyo Metropolitan University, Japan in 2017. After he worked for Tokyo Metropolitan University, Japan as a research assistant professor, he joined the School of Engineering, Tokyo University of Technology, as an assistant professor at the Department of Mechanical Engineering in 2019. He has received the Excellent Paper Award of 22th Intelligent System Symposium, Fuzzy, Artificial Intelligence, Neural Networks and Computational Intelligence, Japan in 2012, the Best Presentation Award, International Conference on Fuzzy Theory and Its Applications, Republic of Korea in 2018. His current interests are in the fields of mechatronics, computational intelligence, and human-friendly robot partner.

Accelerated First-Order Distributed Method for Nash Equilibria of Convex-Concave Bilinear Two-Network Zero-Sum Games

Xianlin Zeng
Beijing Institute of Technology, China
2020.09.28

Abstract: Due to the big data/scale of many modern applications and rise of distributed optimization/game, simple first-order gradient descent algorithms have become dominant and have been particularly revisited because gradients are often computed in a cheap and distributed way. Many researchers focus on the development of accelerated first-order algorithms. However, most existing works focus on unconstrained optimization problems. Convex-concave bilinear two-network zero-sum games have applications in several domains such as machine learning, optimization, and game theory. This talk will introduce a recent result on a dynamical accelerated first-order method for Nash equilibria seeking of a class of two-network zero-sum games. The proposed method achieves an O(1/t2) convergence rate in some sense, which is consistent to Nesterov's accelerated method for unconstrained optimization problems.

Xianlin Zeng received the B.E. and M.S. degrees in Control Science and Engineering from the Harbin Institute of Technology, Harbin, China, in 2009 and 2011, respectively, and the Ph.D. degree in Mechanical Engineering from the Texas Tech University in 2015. He worked as a postdoctoral researcher in National Center for Mathematics and Interdisciplinary Sciences, Chinese Academy of Sciences, Beijing, China, from 08/2015 to 07/2017. After that, he worked as a postdoctoral researcher in Beijing Institute of Technology, Beijing, China, from 08/2017 to 08/2019. He joined the School of Automation, Beijing Institute of Technology, as an associate professor in 09/2019. He is with research specialization in the areas of nonsmooth cooperative control and decision of multi-agent systems. His research interests include distributed algorithms for nonsmooth optimization and games, optimization-based and game theory-based control of unmanned autonomous systems, and distributed computation of matrix equations and inequalities. He has published 5 first-author papers in top control science and engineering journals IEEE Transactions on Automatic Control, Automatica, and SIAM Journal on Control and Optimization.

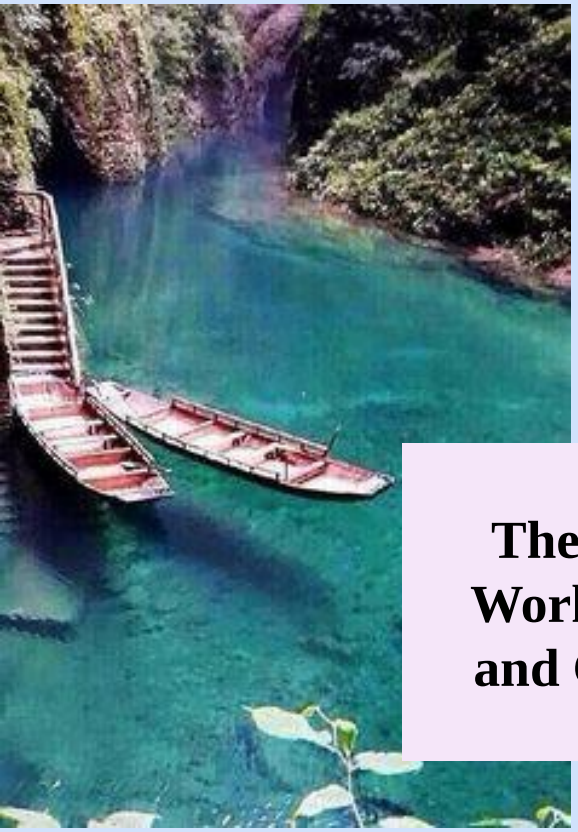
Technology and Application of Intelligent Humanoid Robot System

Xin Chen
China University of Geosciences, China
2020.09.28

Abstract: After recent advancement of computing and robotics technologies, intelligent robot system spread widely all walks of life. However, these robots face several typical engineering challenges. First of all, the intelligent perception of the environment is the basis of robot operation. Secondly, the robot has real-time decision-making ability to external information. Finally, high precision control can be performed to achieve the target operation. Two typical robot systems, live working robot system and dulcimer intelligent playing robot system, are introduced in detail in this report. A complex workspace environment perception technology put forward by combining broad-spectrum light source and binocular vision to realize high-precision positioning of different sizes of operation targets. A humanoid behavior learning model is proposed, which can realize intelligent real-time decision-making of dual-arm performance by learning the behavior habits of human professional players. A humanoid trajectory planning method is introduced to realize the anthropomorphic motion of two arms with joint constraint. Some preliminary results are demonstrated via video.

Xin Chen received his B.S. and M.S. degrees in engineering from Central South University, Changsha, China, in 1999 and 2002, respectively, and the Ph.D. degree in engineering from University of Macau, China, in 2007. He finished his postdoctoral research on control science and engineering at Central South University. He is currently a Professor with the School of Automation, China University of Geosciences. He won the Science Fund for Distinguished Young Scholars of Hubei Province, and the Distinguished Professor of “Chutian Scholar Program” of Hubei Province. He was a visiting professor with the Department of Electrical and Computer Engineering of the University of Alberta from December 2018 to December 2019.

His research interests include intelligent control, multi-agent systems, robotics and process control. He is the member of Technical Committee of Control Theory, Education Works Committee and Youth Works Committee of Chinese Association of Automation, also the member of Society of Intelligent Aerospace Systems of Chinese Association for Artificial Intelligence. He served as the program committee chair of 37th Chinese Control Conference (CCC 2018).



The 13th China-Japan International Workshop on Information Technology and Control Applications (ITCA2020)

Homepage: http://itca.cug.edu.cn