



Hosted By



甘肃省机器人技术学会
Gansu Robotics Technology Society

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Welcome Address

It is our great pleasure to invite you to join the International Conference of Intelligent Robotic and Control Engineering (IRCE), which is sponsored by IEEE, hosted by Lanzhou Jiaotong University, China, and Gansu Robotic Technology Society (GRTS), supported by Lanzhou University of Technology, China, Gansu Agricultural University, China, Gansu Mechanical Science Research Institute, and Gansu Academy of Sciences. This event will provide the unique opportunity to have fruitful discussions about Intelligent Robotics, Automations and Control Engineering, and best practices that address Artificial Intelligence. The IRCE conference aims to foster interdisciplinary and international collaboration opportunities, and strengthen domestic and international recognition in pure and applied research for the participants.

This conference program is highlighted by four Keynote Speakers: Prof. Jie Chen, President of Tongji University, China; Academician of the Chinese Academy of Engineering, China; Prof. Sam Shuzhi Ge, National University of Singapore, Singapore (IEEE FELLOW); Prof. Wang Jun, the Chinese University of Hong Kong, Hong Kong (IEEE FELLOW); and Prof. Ing. Alberto Rovetta, Politecnico di Milano, Italy.

One best presentation will be selected from each session, evaluated from: originality; applicability; technical Merit; qualities of PPT; English. The best one will be announced and awarded the certificate at the end of each Session.

Lanzhou Jiaotong University (LZJTU) (formerly Lanzhou Railway University) was established in 1958 through the combination of departments and sections from two highly reputable Chinese railway institutes: Tangshan Railway Institute (the present Southwest Jiaotong University) and Beijing Railway Institute (the present Beijing Jiaotong University).

We wish you a successful conference and enjoyable visit in Lanzhou!

Conference Organizing Committees
Lanzhou, China



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Conference Committees

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60th Anniversary of Lanzhou Jiaotong University

Mo Hongwei, Harbin Engineering University, China
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Hui-Zhu Wang, Ningxia University, China
Zhi-Bing Xue, Qinghai University, China
Alberto Rovetta, Politecnico di Milano, Italy
Zhiwei Lin, School of Computing, Ulster University, United Kingdom
Haoxun Chen, University of Technology of Troyes, France
Kai-Kuang Ma, Nanyang Technological University, Singapore
Yu-wang Chen, The University of Manchester, United Kingdom



Keynote Speaker



“Intelligent Cooperative Decision and Control of Multi-Agent Systems”

Prof. Jie Chen, President of Tongji University, China (Academician of the Chinese Academy of Engineering)

Abstract: The multi-agent systems have been shown to have wide and important applications in unmanned aerial vehicles, unmanned ground vehicles, unmanned warehouses, etc. Due to the intelligence, security and reliability requirements of multi-agent systems, the research on intelligent cooperative decision and control becomes increasingly urgent. In this presentation, three relevant research topics are introduced in detail: intelligent command and decision of multi-agent systems, cooperative fault detection and multi-agent sharing control. Correspondingly, the crucial techniques are presented for the role-based linear temporal logic design, cooperative fault detection based on H_∞/H_2 hybrid optimization and multi-objective optimization based sharing control. Finally, the future trends of the related research fields are given.

BIO: Prof. Jie Chen is an Academician of Chinese Academy of Engineering, the President of Tongji University, Director of the State Key Laboratory of Intelligent Control and Decision of Complex Systems, Chief Scientist of a National 973 Basic Research Program, Principal Investigator of an Innovative-Research-Group Program supported by the Natural Science Foundation of China (NSFC). He is a Distinguished Young Scholar awarded by the NSFC, and a Changjiang Scholar Distinguished Professor awarded by the Chinese Ministry of Education. He serves as the Vice President of the Chinese Association of Automation, and an Executive Director of the Chinese Artificial Intelligence Society. He is also the Managing Editor for the Journal of Systems Science and Complexity, and editorial board members and associate editors for several renowned international journals, such as IEEE Transactions on Cybernetics, International Journal of Robust and Nonlinear Control, Science China Information Sciences, Control Theory & Technology, etc.

His main research interests include multi-objective optimization and decision for complex systems, cooperative control of multi-agent systems, and constrained nonlinear control. He has authored/co-authored 4 monographs and more than 80 SCI journal papers, and holds 43 patents of invention. He has received the second prize of National Natural Science Award of China once and the second prizes of National Science and Technology Progress Award of China twice.

Plenary Speakers



Prof. Sam Shuzhi Ge, National University of Singapore, Singapore (IEEE FELLOW)

BIO: Prof. Sam Shuzhi Ge, IEEE Fellow, P.Eng, is the Director of Social Robotics Lab, Interactive Digital Media Institute, and Supervisor of Edutainment Robotics Lab, Department of Electrical and Computer Engineering, The National University of Singapore. He received his PhD degree and DIC from the Imperial College, London, and BSc degree from Beijing University of Aeronautics & Astronautics. He has (co)-authored three books, and over 300 international journal and conference papers. He serves as Vice President of Technical Activities, 2009-2010, and Member of Board of Governors, 2007-2009, and Chair of Technical Committee on Intelligent Control, 2005-2008, of IEEE Control Systems Society. He served as General Chair and Program Chair for a number of IEEE international conferences. He is the Editor-in-Chief, International Journal of Social Robotics, and Springer. He has served/been serving as an Associate Editor for a number of flagship journals including IEEE Transactions on Automatic Control, IEEE Transactions on Control Systems Technology, IEEE Transactions on Neural Networks, and Automatica, and Book Editor for Taylor & Francis Automation and Control Engineering Series. He was the recipient of Changjiang Guest Professor, MOE, China, 2008; and Fellow of IEEE, USA, 2006.



“Intelligent Control Based on Neurodynamic Optimization”

*Prof. Jun Wang, Department of Computer Science and School of Data Science
City University of Hong Kong, Kowloon, Hong Kong (IEEE FELLOW)*

Abstract: Neurodynamic optimization play important roles intelligent control. In this talk, neurodynamic optimization approaches will be presented for in synthesis and realization of intelligent control systems. First, the robust pole assignment of linear control systems will be introduced based on neurodynamic optimization. Then, neurodynamics-based reference or command governor optimization will be delineated. Next, nonlinear and robust model predictive control based neurodynamic optimization will be discussed. Simulation and experimental results will also be shown to demonstrate the efficacy and performance of the proposed neurodynamics-based approaches for the intelligent control of various dynamic systems.

BIO: Prof. Jun Wang is the Chair Professor Computational Intelligence in the Department of Computer Science at City University of Hong Kong. Prior to this position, he held various academic positions at Dalian University of Technology, Case Western Reserve University, University of North Dakota, and the Chinese University of Hong Kong. He also held various short-term visiting positions at USAF Armstrong Laboratory, RIKEN Brain Science Institute, Dalian University of Technology, Huazhong University of Science and Technology, and Shanghai Jiao Tong University (Changjiang Chair Professor). He received a B.S. degree in electrical engineering and an M.S. degree in systems engineering from Dalian University of Technology and his Ph.D. degree in systems engineering from Case Western Reserve University. His current research interests include neural networks and their applications. He published over 200 journal papers, 15 book chapters, 11 edited books, and numerous conference papers in these areas. He is the Editor-in-Chief of the IEEE Transactions on Cybernetics. He also served as an Associate Editor of the IEEE Transactions on Neural Networks (1999-2009), IEEE Transactions on Cybernetics and its predecessor (2003-2013), and IEEE Transactions on Systems,



Man, and Cybernetics – Part C (2002–2005), as a member of the editorial board of Neural Networks (2012-2014), editorial advisory board of International Journal of Neural Systems (2006-2013). He was an organizer of several international conferences such as the General Chair of the 13th International Conference on Neural Information Processing (2006), the 2008 IEEE World Congress on Computational Intelligence, the 25th International Conference on Neural Information Processing (2018), and a Program Chair of the IEEE International Conference on Systems, Man, and Cybernetics (2012). He is an IEEE Fellow, IAPR Fellow, CAAI Fellow, and an IEEE Systems, Man and Cybernetics Society Distinguished Lecturer (2017-2018), and was an IEEE Computational Intelligence Society Distinguished Lecturer (2010-2012, 2014-2016). In addition, he served as President of Asia Pacific Neural Network Assembly (APNNA) in 2006 and many organizations such as IEEE Fellow Committee; IEEE Computational Intelligence Society Awards Committee; IEEE Systems, Man, and Cybernetics Society Board of Governors, He is a recipient of an IEEE Transactions on Neural Networks Outstanding Paper Award and APNNA Outstanding Achievement Award in 2011, Neural Networks Pioneer Award from IEEE Computational Intelligence Society in 2014, among other distinctions.



“Robotics of Artificial Intelligence and Nanotechnologies for Human and Post-Human Progress”

Prof. Ing. Alberto Rovetta, Politecnico di Milano, Italy; Beihang University, Beijing, Professor Emeritus, China

Abstract: In the history of humanity, we have never witnessed an increase in knowledge, culture, quality of life, wealth, as in the years after 2000. Science today is transformed into technology and into new technologies, which, if they have a economically valid result, they continue their existence with new products and results. The science of the human concerns life and human nature, which is intelligence and feeling. We have seen that robotics since 1970 has changed the world of work in a pervasive and increasingly widespread way. With just a few robots in the 70s and more than 3 million industrial robots today, industrial robotics built robots for heavy, repetitive, laborious and risky machining, and invaded the industrial culture of the late 1900s in an implacable way. last years artificial intelligence has been reborn, after the "long winter" of the years from 1985 to 2005. In the time called "the winter of artificial intelligence", around 1990, robotics continued its development undaunted, without however growing in system intelligence and the logical ability to manage situations, but able to perform well repeated, difficult actions, with control of movement and results. For artificial intelligence, new developments have come from the other road, that of cellular communication, from mobile phones, from the immense world of Internet networks after 2000, from communications and above all from data, word, text, voice, images. The world outside the human has entered heavily into the human. Slow companies have disappeared in their reaction to new realities. We had to grow in new directions with little expense and a lot of intelligence. An important contribution was made between 1996 and 2000 when scientific neurology was inserted into the logical processes of computers and consequently into robotics. The results of the neurological research showed how the right lobe of the brain, which lives on emotions, sensations, affects, was completely ignored in practical and informatic developments, and how they spoke only of logical actions created by the left hemisphere of the brain. Neurology finally offered its essential contribution.

BIO: In 1980, **Prof. Ing. Alberto Rovetta** was appointed Full Professor in the Group of Machine applied Mechanics with a chair in Robot Mechanics, having previously held the chair in Machine Elements with design at the Politecnico di Milano (Faculty of Engineering). From 1991 he worked as a Professor in Robot Mechanics.



From 1991-'92 he taught the Course in "Robot Mechanics" at the Politecnico di Milano (Faculty of Engineering). He also was teaching as Professor some courses in Industrial Design (Degree Course) at the Politecnico di Milano, Faculty of Architecture, where he conducted courses in: Visual Communication (1994); Foundations and Methods of Industrial Design (1995); Modelling and simulation of mechanical systems (1996), Robotics (1997). He also lectured in Bioengineering: Modelling and simulation of mechanical systems (1992, 1993). Now Professor of Progettazione Innovativa di Robot Intelligentie di Sistemi Autonomi from 2006-2007, Politecnico di Milano, Laurea Specialistica, also in internet. Professor of the Course of Robotica Spaziale from 2005-6, for Ph.Students of Politecnico di Milano, also in Internet. Professor of Course in Space Robotics at Beihang University, from 2006-7, also in Internet. Please browse more details here:

http://www.museidinamici.cloud/robotica/cv/rovetta_en.php



Agenda

August 24 Friday Onsite Registration		
9:00-17:00	Venue: 3rd Floor Hall, Convention Center, Education & Technology Building, Lanzhou Jiaotong University. Note: *Collecting conference materials *Certificate of oral presentations will be signed and issued after each session. *Certificate of poster presentations and listeners will be got when collect conference materials at Registration Desk, please ask chair to sign it for you. *Accommodation not provided, and it's suggested to make an early reservation. *Take care of all your belongings during the conference days.	
19:00-21:00	Buffet Dinner （ Guotai Anning Hotel）	
August 25 Saturday Keynote & Plenary Speeches & Presentation Day		
C1 Venue: 302 Room, Convention Center,Education&Technology Building		
8:20-8:40 Opening	Zijiang Yang, Party Secretary of Lanzhou Jiaotong University, China	Prof. Jianwu Dang Vice-president of Lanzhou Jiaotong University
	Jun Wang, Professor of Chinese University of Hong Kong IEEE Fellow, IAPR Fellow	
8:40-9:00	Group Photo	
9:05-9:45	Keynote Speech—Prof. Jie Chen, President of Tongji University, China; Academician of Chinese Academy of Engineering	Prof. Shiyin Qin Beihang University
9:45-10:25	Plenary Speech I—Prof. Sam Shuzhi Ge, National University of Singapore, Singapore (IEEE FELLOW)	
10:25-11:00	Coffee Break & Poster Presentation	
11:00-11:40	Plenary Speech II—Prof. Jun Wang, Chinese University of Hong Kong, Hong Kong (IEEE FELLOW)	Prof. Guangtian Shi Lanzhou Jiaotong



11:40-12:20	Plenary Speech III—Prof. Ing. Alberto Rovetta, Politecnico di Milano, Italy	University
12:20-14:00	Buffet Lunch （Guotai Anning Hotel）	
C2 Venue: Convention Center, Education&Technology Building		
14:00-16:15	Parallel Session A-1 Room 305	Parallel Session B-1 Room 308
16:15-16:30	Coffee Break	
16:30-18:15	Parallel Session A-2 Room 312	Parallel Session B-2 Room 313
18:30-21:30	Banquet Dinner （Guotai Anning Hotel）	
August 26, 2018 Sunday Lab visit		
09:30-12:00	Lab visit in Lanzhou Jiaotong University	
12:00-14:00	Buffet Lunch （Guotai Anning Hotel）	
14:00-	Free Time	
August 27, 2018 Monday One Day Tour		
9:00-17:00	Optional One Day Tour	

*The Group Photo will be updated online.

**One best presentation will be selected from each session; the best one will be announced at the end of each session, the winner will be awarded a winner certificate at the dinner event. The winners' photos will be updated online.

***Best Presentation will be evaluated from: Originality; Applicability; Technical Merit; PPT; English.

****Please arrive at the conference room 10 minutes earlier before the session starts, copy your PPT to the laptop.



Conference Program

Guidelines for Presentations

Instructions for Presenters

Speakers are requested to be in their respective session rooms at least 10 minutes prior to the commencement of each session.

The duration of a plenary presentation is 45 minutes, and an invited presentation is 20 minutes. This includes 17 minutes for the presentation and 3 minutes for Q&A. The duration of a regular presentation is 15 minutes. This includes 12 minutes for the presentation and 3 minutes for Q&A. We would appreciate if all presenters can adhere strictly to this time limit.

Presentation must be carried out using Microsoft PowerPoint or PDF. No slide projectors will be made available.

Speakers should prepare their presentation materials in a thumb-drive and upload the files from 8:00-8:30 daily or during the coffee breaks or lunches or before the session starts.

Instructions for Presiders

Please time the presentation. Remind the speaker as follows

Regular Talk: One ring at 10 minutes, two rings at 12 minutes.

It is a good idea to remind your speakers at the start of the session that you will time the speech. Please remember the time frame. Keeping the program to time is very important. Please be aware of the time periods speakers have been designed to present.

If someone in your session didn't show up, please go on with next speaker, and recall the missing one every time when it's next speaker's turn. In this case, we require the speakers of each session should stay the whole session.

Instructions for Poster Presentation

Poster presenter can leave your post at the registration desk, our staff will help you to put up the posters at least 1 hour prior to the commencement of each poster session.

At least one author should be present for each poster during the poster session.



24 August, Friday

Time	Activity	Representative
9:00-17:00	Onsite registration	Conference Kits Collection@ Room 302

Onsite Registration

Venue: 3rd Floor Hall, Convention Center, Education & Technology Building, Lanzhou Jiaotong University.

Time: 9:00-17:00

Conference Packages:

Representative Card

Conference Program

Welcome Reception Ticket

Gala Dinner Coupon

Note

1. Today is for collecting conference materials and on-site registration.
2. Certificate will not be available at the registration desk until you finish the presentation at the conference day (except the listeners).
3. Accommodation is not provided, and it's suggested to make an early reservation, since it's high season during the conference period.
4. At 18:00, all authors take ferry bus parked near Education & Technology Building to Guotai Anning Hotel for buffet dinner.



25, August , Saturday

Time	Activity	Representative VENUE: Room 302	
08:20-08:40	Opening Remarks	Zijiang Yang , <i>Party secretary of Lanzhou Jiaotong University, China</i> Jie Chen , <i>President of Tongji University, China (Academician of the Chinese Academy of Engineering)</i>	Chair Jianwu Dang
08:40-09:00	IRCE 2018 Group Photo		
09:05-09:45	Keynote Speech	"Intelligent Cooperative Decision and Control of Multi-Agent Systems" Prof. Jie Chen , <i>President of Tongji University, China (Academician of Chinese Academy of Engineering)</i>	Chair Shiyin Qin
09:45-10:25	Plenary Speech-I	Prof. Sam Shuzhi Ge , <i>National University of Singapore, Singapore (IEEE FELLOW)</i>	
10:25-11:00	Coffee Break & Poster Presentation		
11:00-11:40	Plenary Speech-II	"Intelligent Control Based on Neurdynamic Optimization" Prof. Jun Wang , <i>The Chinese University of Hong Kong, Hong Kong (IEEE FELLOW)</i>	Chair Guangtian Shi
10:40-12:20	Plenary Speech-III	"Robotics of Artificial Intelligence and Nanotechnologies for Human and Post-Human Progress" Prof. Ing. Alberto Rovetta , <i>Politecnico di Milano, Italy</i>	
Session A-1 "Intelligent Robot and Control Technology" Chair: Yong Chen, Lanzhou Jiaotong University, Lanzhou, China VENUE: Room 305			
14:00-14:15	(CE003) Simulation and analysis for propulsion mechanism of carangiform robotic fish on ADAMS Runfeng Zhang , Haiyang Zhang School of Mechanical Engineering, Tianjin University, Tianjin, China		Page:18
14:15-14:30	(CE004) A Research on Area Coverage Algorithm for Robotics Yaru Kang , Dianxi Shi National University of Defense Technology, China		
14:30-14:45	(CE008) Disturbance Observer Based Composite Nonlinear Feedback Controller Design for Robot Manipulators Chenglong Gong, Yuan Jiang Dept. College of Information Engineering, Nanchang Hangkong University, China		
14:45-15:00	(CE029) Research and Implementation of SLAM Based on LIDAR for Four-wheeled Mobile Robot Dong Shen, Yakun Huang , Yangxi Wang and Chaoyang Zhao Lanzhou JiaoTong University, China		Page:19



15:00-15:15	(CE031) Research on Four-wheeled Indoor Mobile Robot SLAM Based on RBPF Algorithm Qiang Li, Yangxi Wang , Yakun Huang, Xia Huang Lanzhou JiaoTong University, China	Page:19
15:15-15:30	(CE007) Traffic Flow Modeling and Simulation Based on A Novel Cellular Learning Automaton Yong Chen , Hong He , Ning Zhou Lanzhou Jiaotong University, China	
15:30-15:45	(CE040-A) Design and implementation of road lane following controller for 1:10 scale autonomous car Michał Jarzyński , Mikołaj Marcinkiewicz, Mateusz Perciński Warsaw University of Technology Faculty of Power and Aeronautical Engineering, Poland	
15:45-16:00	(CE041-A) Sensor data fusion for assessment of driving performance of 1:10 scale autonomous car Michał Jarzyński, Mikołaj Marcinkiewicz, Mateusz Perciński , Mateusz Grudzień Warsaw University of Technology Faculty of Power and Aeronautical Engineering, Poland	Page: 20
16:00-16:15	(CE057) Mobile Robot Path Planning Based on Improved Artificial Potential Field Method Siming Wang , Tiantian Zhao and Weijie Li Automation and Electrical Engineering, Lan Zhou Jiaotong University, China	
16:15-16:30	Coffee Break	
Session B-1 “Computer Science and Control Engineering” Chair: Chi-Cheng Cheng, National Sun Yat-Sen University, Kaohsiung, Taiwan, R.O.C. VENUE: Room 308		
14:00-14:15	(CE038) Delay-dependent Stability Analysis for Polynomial Fuzzy Systems with Time-varying Delay via Delay-partitioning Approach Jiafeng Yu, Qinsheng Li , Chunsong Han Marine Engineering College Jiangsu Maritime Institute, Nanjing, China	Page:21
14:15-14:30	(CE046) Code Authority Control Method Based on File Security Level and ACL in WebIDE Junhuai Li, Wenchao Ji , Jubo Tian, Huaijun Wang and Kan Wang Xi’an University of Technology, China	
14:30-14:45	(CE048) A New Instance-weighting Naive Bayes Text Classifiers Yongcheng Wu Jingchu University of Technology, China	
14:45-15:00	(CE053) A dictionary learning algorithm for gene expression profile classification based on feature selection Zhiqiang Zhang , Yonggang Lu and Shaoliang Peng College of Computer Science National University of Defense Technology, China	Page:22



15:00-15:15	(CE064) Research on Control Strategy in Wireless Location System Shaohua Chen, Meiling An School of Electrical Engineering, Dalian Jiao tong University, Dalian, China	Page:22
15:15-15:30	(CE066) Research on Control Strategy in Wireless Location System Jingyi Feng , Haifeng Wu, Yu Zeng School of Electrical and Information Technology, Yunnan Minzu University, China	
15:30-15:45	(CE073) Neural Decoding for Location of Macaque’s Moving Finger Using Generative Adversarial Networks Caizhi Liu , Yanxiu Sheng, Zhiqiang Wei and Yongquan Yang College of Information Science & Engineering, Ocean University of China, Qingdao, China	Page:23
15:45-16:00	(CE009) Realization of 3D Stereo Imaging for Underwater Applications Chi-Cheng Cheng , HaoTing Yang Department of Mechanical and Electro-Mechanical Engineering, National Sun Yat-Sen University, Kaohsiung, Taiwan, R.O.C.	
16:15-16:30	Coffee Break	
Session A-2 “Image Processing and Computer Vision” Chair: Xiaofeng Lian, Beijing Technology and Business University, China VENUE: Room 312		
16:30-16:45	(CE005) High Confidence Updating Strategy on Staple Trackers Qian Zou , Shaofu Lin, Yanan Du School of Software Engineering, Beijing University of Technology, Beijing, 100124, China	Page:23
16:45-17:00	(CE010-A) Feasibility analysis and Application of the application of 4G-LTE technology in vehicle-ground communication of the modern tram Tao He , Tong Zhao Lanzhou Jiaotong University, China	Page:24
17:00-17:15	(CE072) Image Retrieval Based on a Hybrid Model of Deep Convolutional Encoder Jingkun Qin , Haihong E, Meina Song and Zhijun Ren School of Computer Science, Beijing University of Posts and Telecommunications, China	
17:15-17:45	(CE1002-A) Semantic Visual Localization and Mapping Based on Deep Learning in Dynamic Environment Linhui Xiao , Jinge Wang, Xiaosong Qiu, Zheng Rong, Xudong Zou Institute of Electronics, Chinese Academy of Sciences, China	
17:45-18:00	(CE032) Product Surface Defects Detection Based on Multiple-Kernel Learning Feature Fusion Method Han Jia , Xiaofeng Lian Beijing Technology and Business University, China	Page25
18:00-18:15	(CE055) Recognizing human actions using 3d motion trail model	Page: 25



	Song Wang, Jianwu Dang, Yangping Wang, Lixia Liu , Zhenhai Zhang Lanzhou Jiaotong University, China	
18:15-20:00	Gala Dinner @ Guotai AnNing Hotel	
Session B-2 “Electrical engineering and automation” Chair: Jun Cai, Anhui University of Science and Technology, China VENUE: 313		
16:30-16:45	(CE012) Probability Model of Traction Load Using Histogram Density Estimation Based on Optimal Binwidth Yulong Che , Xiaoqin Lv, Xiaoru Wang, Zhenli Lin, Kun Jiang School of Electrical Engineering, Southwest Jiaotong University, Chengdu, China	Page:26
16:45-17:00	(CE2002) Wind turbine condition assessment method based on variable weight theory and fuzzy comprehensive evaluation Haiying Dong , Kelei Xu, Lixia Yang, Hao Zhang Lanzhou Jiaotong University, China	
17:00-17:15	(CE076) Pixel-to-action Policy for Underwater Pipeline Following via Deep Reinforcement Learning Yanan Liu, Fang Wang, Zeyu Lv , Kaihui Cao, Yuanshan Lin Dalian Ocean University, China	
17:15-17:45	(CE078) High Speed Digital Data Interface for OLED-on-silicon Micro-Display Jun Cai , Xiaofeng Chen, Yuan Ji Anhui University of Science and Technology, China	Page:27
18:15-20:00	Banquet @ Guotai AnNing Hotel	

Poster Presentation VENUE: Room 302, Convention Center, Education & Technology Building (Outside) Chair: Fuping Wang, North Minzu University Time: 10:25-11:00		
(CE007) Traffic Flow Modeling and Simulation Based on A Novel Cellular Learning Automaton Yong Chen , Hong He, Ning Zhou School of Electronic and Information Engineering, Lanzhou Jiaotong University, Lanzhou, China	Page: 27	
(CE015) Study on Dynamic and Switched Control System of Arterial Traffic Signal Based on Multi-Agent Chuandong Ding , Zian Tang, Minan Tang Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou 730070, China		
(CE017) Application of High-Order Sliding Mode variable structure Control based on Power- function in Doubly Fed Induction Generator Qiang wen Li , Qingfang Teng, Yiseng Wang, Xiping Ma Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou, 730070, China	Page:28	
(CE019) Research on Assembly Sequence Planning Based on Fluid Flow Mechanism Xiaoyu Hu , Bo Gao		



School of Mechanical Engineering, Lanzhou Jiaotong University, Lanzhou 730070, China	
(CE022) Passive Control of Permanent Magnet Direct Drive Wind Power Generation System Based on ESO Changle Li , Qingfang Teng Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou Gansu 730070, China	Page:28
(CE024) Model Predictive Torque Control For PMSM Driven by Three-level Inverter Based on Extended Kalman Filter Speed Observer Xiao Han , Qingfang Teng, Weiduo Luo Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou Gansu 730070, China	Page: 29
(CE025) Research on Inverse Kinematics of Robot Based on Motion Controller Fuping Wang , Zhengjun Zhao North Minzu University, Innovation and Entrepreneurship College, Yinchuan, China	
(CE028) Adjustment of Train Interval Time Based on Dynamic Programming Algorithm Shenglin Gao , Yunshui Zheng School of Automation & Electrical Engineering, Lanzhou Jiaotong University, Lanzhou, China	
(CE034) Energy Consumption Modeling and Energy Saving Analysis of Supercapacitor Tramcar Lin Chen and Chenlong Sun The Electrification Company of CCCC Tunnel Engineering Co., Ltd, China	
(CE035) Design and Implementation of Energy Consumption Data Collector for Tram Stations Xiaoxiang Tang and Qiwei Ren CCCC Tunnel Engineering Bureau Co, Ltd., China	Page:30
(CE036) Research on energy consumption data analysis method of tram system Lin Chen and Dongping Wang China Railway Tunnel Bureau Electrification Engineering Co., Ltd., China	
(CE037) Research on Effectiveness Evaluation Method of the Integrated Naval Gun and Laser Weapon System Weiyi Chen, Guoqiang Liu , Huadong Liu, Han Cheng Department of Ordnanc, Naval University of Engineering Wuhan, China	
(CE039) Energy Consumption Prediction of Trams Based on Grey Relational Analysis and Regression Model Zhipeng Yan , Yongzhi Min Lanzhou Jiaotong University, Lanzhou, China	Page: 31
(CE042) Inertial Navigation System Calibration based on Direction Cosine Matrix Matching Fangjun Qin , Lubin Chang, Sai Jiang Department of Navigation Engineering, Naval University of Engineering, Wuhan, China	
(CE2001) The Study on Fabrication of Solid Metal Microneedles Based on Optimized Process of Electrochemical Etching and Cutting	Page:31



<p>Zhibiao Li, Xiaoxiao Yan, Min Hu, Gang Tang, Zhichun Li Jiangxi Provincial Key Lab of Precision Drive and Control, Nanchang Institute of Technology, Nanchang, China</p>	
<p>(CE047) The Deep Neural Network Algorithm Based on Meteorological Features is in the Medium and Long Term</p>	Page:32
<p>Tengfei Wang, Gang Li, Cao Wu Mechatronics T&R Institute, Lanzhou Jiaotong University, Lanzhou 730070,China</p>	
<p>(CE049) Co-simulation Research Based on Position Tracking of Quadrotor Vehicles</p> <p>Dong Zhai, Xiangju Jiang, Wei Peng Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou,China</p>	
<p>(CE056) Modelling and Control of Fully Constrained Cable-driven Parallel Mechanism As a Marine Salvage Device</p>	Page:32
<p>Yiliang Tong, Jingfeng He Dept. School of mechatronics engineering, Harbin Institute of Technology, HIT, Harbin, China</p>	
<p>(CE3002) Design, Analysis and Experiment of A Non-humanoid Arm Exoskeleton for Lifting Load</p> <p>Xin Li, Zhengwei Jia, Xiang Cui, Lijian Zhang Research Center of Human Performance Modification Technology, Beijing Institute of Mechanical Equipment, Beijing, China</p>	
<p>(CE059) PMSM Vector Control Based on Improved ADRC</p> <p>Fujun Deng, Yunpeng Guan Department of Electrical and Information Engineering, Dalian Jiaotong University, Dalian,Liaoning,116000,China</p>	Page:33
<p>(CE065) One-shot Learning Gesture Recognition Based on Evolution of Discrimination with Successive Memory</p> <p>Xiaojie Li, Shiyin Qin, Kuanhong Xu, Zhongying Hu School of Automation Science and Electrical Engineering, Beihang University, Beijing, China, 100191</p>	
<p>(CE068) An Automatic Meter Reading Method Based on One-dimensional Measuring Curve Mapping</p> <p>Xiaoming Mai, Wensheng Li, Yan Huang, Yingyi Yang Department of Artificial Intelligence and Robotics, Electric Power Research Institute of Guangdong Power Grid Corporation, Guangzhou, China</p>	
<p>(CE069) Model predictive torque control of PMSM system driven by three-phase eight-switch fault-tolerant inverter</p> <p>Laibao Yang, Bin Zhang Lanzhou Jiaotong university, Lanzhou, Gansu</p>	Page:34
<p>(CE074) Sentence Emotion Classification for Intelligent Robotics based on Word Lexicon and Emoticon Emotions</p> <p>Yunong Wu, Xin Kang, Kazuyuki Matsumoto, Minoru Yoshida, Keranmu Xielifuguli, Kenji Kita Faculty of Engineering, Tokushima University, Tokushima, Japan</p>	



(CE3005) The exploration of the trajectory planning of plant protection robot for small planting crops in western mountainous areas Jiayi Ma , Bugong Sun, Peng Zhang, Keping Zhang Gansu Agricultural University, Lanzhou, China	Page:34
(CE077) A Chaotic-based Digital Watermarking Algorithm for Tag Tamper Detection Shuxu Zhao , Qingsheng Yue School of Electronic & Information Engineering, Lanzhou Jiaotong University, Lanzhou, China	
(CE079) Optimization on PVDF film force sensor for steel ball forging fault diagnosis Yingjun Li , Guicong Wang, Huanyong Cui, Xiangyu Wang School of Mechanical Engineering, University of Jinan, Jinan 250022, PR China	Page:35
(CE080) Research on Lane Detection and Tracking Algorithm Based on Improved Hough Transform Xianwen Wei , Zhaojin Zhang, Zongjun Chai, Wei Feng Department of Electronic Information Engineering, Wuwei Occupational College, Wuwei, Gansu Province, China	
(CE3006) Research of single FBG tactile sensor based on tissue palpation Qi Jiang , Junjie Wang School of Control Science and Engineering, Shandong University, Jinan, China	
(CE3007) Bifurcation sequences of vibro-impact mechanical systems in 1:4 resonance case Sanshan Du , Yuqing Shi, Guanwei Luo School of Mechanical Engineering, Lanzhou Jiaotong University, Lanzhou, PR China	Page: 36
(CE075) Numerical Prediction for Hydrodynamic Coefficient of Small Open-Frame ROV Zhen Wang, Mingxing Lin , Chenggang Dai, Xiaojian Wu, Zhiguang Guan, Dong Zhang School of Mechanical Engineering, Shandong University, China	

26 August, Sunday

Time	Activity	Representative
09:30-12:00	Lab visit	Lanzhou Jiaotong University, China

Collection: Just Before Education & Technology Building at 9:00

2th Floor, Lanzhou Jiaotong Library

- Gallery of University History
- Fabric Dyeing Museum

3th Floor, the Third School Building

- Innovation Base

Technical Program (Oral Presentations)

Session A-1

“Intelligent Robot and Control Technology”

Chair: Runfeng Zhang, Tianjin University, Tianjin, China

VENUE: Room 305

- | | |
|-------------|---|
| 14:00-14:15 | <p>(CE003) Simulation and analysis for propulsion mechanism of carangiform robotic fish on ADAMS</p> <p>Runfeng Zhang, Haiyang Zhang
School of Mechanical Engineering, Tianjin University, Tianjin, China</p> <p>A new kind of propulsion mechanism of carangiform robotic fish is introduced in this paper. The principle of swimming of carangiform fish was analyzed and then illustrated the general working principle of propulsion mechanism, which ensures the stability and flexibility of the robotic fish swimming in the water. According to the design principle and parameters of whole prototype, the carangiform robotic fish have different pitching and yawing motions, which enables the carangiform robotic fish can adapt to complicated environment. Then the velocity of caudal fin was analyzed theoretically and the relationship between oscillating frequency and maximum amplitude were given. Finally using ADAMS software to analyze and simulate the propulsion mechanism, then make a pool test to valid the efficiency of the propulsion mechanism and get a good result, which ensures the robotic fish have a high reliability and practicability in the future.</p> |
| 14:15-14:30 | <p>(CE004) A Research on Area Coverage Algorithm for Robotics</p> <p>Yaru Kang, Dianxi Shi
National University of Defense Technology, China</p> <p>Area coverage path planning is a special path planning method, which requires the robot to go through every point except obstacles in workspace. It has been used in many fields, such as lawn mowing, snow removal, search and rescue task, pesticide spraying, demining robots, cleaning robots and so on. This paper presents the achievements of the last two decades on area coverage. We propose a new Classification based on method of Choset. We analyze and summarize the recently research results by the new classification method and list the advantages and disadvantages. Finally, we give a summary of the classification methods and propose future research directions.</p> |
| 14:30-14:45 | <p>(CE008) Disturbance Observer Based Composite Nonlinear Feedback Controller Design for Robot Manipulators*</p> <p>Chenglong Gong, Yuan Jiang
Dept. College of Information Engineering, Nanchang Hangkong University, China</p> <p>When the robot system is disturbed, the control performance of the controller will be weakened, causing the system to generate positioning errors and vibration. The composite nonlinear feedback (CNF) controller based on disturbance observer proposed in this paper can solve this problem effectively. The simulation results show that the new controller can not only retain the advantages of the CNF, but also can effectively suppress the influence of disturbance on the system, it can make the system achieve better control performance and strong robustness.</p> |



14:45-15:00 (CE029) Research and Implementation of SLAM Based on LIDAR for Four-wheeled Mobile Robot

Dong Shen, **Yakun Huang**, Yangxi Wang and Chaoyang Zhao
Lanzhou Jiaotong University, China

The optimization of the tracking interval time is the main research field for improving the railway transportation capacity. At present, tracking interval time of high-speed railway has basically reached the 5-minute or 3-minute in China. To further shorten the train tracking interval time, this paper selects the line gradient parameter as the optimization parameter to establish the multi-stage decision model based on dynamic programming, and uses COADP algorithm (an improved algorithm based on dynamic programming) to optimize the braking distance of the train. Basing on Bellman's theorem, the COADP algorithm optimizes the line gradient reduction program and solves the phase variable optimal solution, state variable optimal solution, optimal decision sequence, optimal index function and optimal value function. By obtaining the optimal objective function of the EMU braking distance, the algorithm optimizes the tracking interval time of EMU and enhances the high-speed railway transportation capacity.

15:00-15:15 (CE031) Research on Four-wheeled Indoor Mobile Robot SLAM Based on RBPF Algorithm

Qiang Li, **Yangxi Wang**, Yakun Huang, Xia Huang
Lanzhou Jiaotong University, China

Simultaneous localization and mapping (SLAM) of mobile robots in indoor unknown environments is one of the focuses of present robot researching. In order to realize indoor mapping, it proposes to that the four-wheeled mobile robot equipped with laser radar implements SLAM with RBPF algorithm. It can locate the robot in the process of indoor movement, and then the laser radar scans out the position obstacles and updates in real time, achieving the indoor mapping. The experiments are showing that the method proposed here can construct accurate map relatively and achieve the desired results.

15:15-15:30 (CE007) Traffic Flow Modeling and Simulation Based on A Novel Cellular Learning Automaton

Yong Chen , Hong He , Ning Zhou
Lanzhou Jiaotong University, China

A novel cellular learning automaton traffic flow model is proposed to solve the problem that the probability of randomization in the NaSch model is not consistent with the actual traffic. The learning mechanism is introduced in this model. Cellular can learn traffic information from cellular neighbors in real time. The traffic environment information, such as, relative speed and safety distance will be cellular parallel ruler through the randomization probability form after learning. Finally through numerical simulation, the space-time characteristics were obtained, and comparison with the NaSch model is analyzed. The results show that the improved model can reduce the blocking the road to a certain extent and traffic jam dissolving efficiency is higher. The stability analysis of vehicle running from two aspects of speed fluctuation and headway fluctuation shows that the method in this paper can make traffic flow more stable.

15:30-15:45 (CE040-A) Design and implementation of road lane following controller for 1:10 scale autonomous car

Michał Jarzyński, Mikołaj Marcinkiewicz, Mateusz Perciński
Warsaw University of Technology Faculty of Power and Aeronautical Engineering, Poland

This paper presents control system designed and implemented for 1:10 scale autonomous car. The

controlled vehicle was designed and built to compete in Carolo-Cup contest. During that event, vehicles are supposed to maneuver autonomously in road-like environment. The paper describes, what architecture is used to secure stable steering. A variety of common, but reliable sensors assure ease of use of the system. View extracted from camera is processed to obtain certain road features. Computer vision in addition to highly precise speed measurement from encoders, is used to steer the car. It utilizes various control theory tools to achieve decent results in its environment. Designed system is fed with actual horizontal position of car on the lane and estimated curvature of the forthcoming road. In contrary to standard control approaches, lane tracking regulator is coupled with speed controller to maximize vehicle operating speed. As part of making PID adjustment more robust, we implemented a self-diagnostic tool, which can make slight tuning depending on current car load and road slippery. Our advance is providing a complex solution for tasks that require stable and efficient steering, whereas computational power is limited. In the era of cost and resource optimization this could serve as a smart implementation of all-around driving scheme for autonomous robots. The design of control system is based primarily on intuitive concepts, which enables easier interpretation of the results. Experimental outputs on real 1:10 scale car prove effectiveness of our algorithm and possibility to extend its application.

15:45-16:00 (CE041-A) Sensor data fusion for assessment of driving performance of 1:10 scale autonomous car

Michał Jarzyński, Mikołaj Marcinkiewicz, **Mateusz Perciński**, Mateusz Grudzień

Warsaw University of Technology Faculty of Power and Aeronautical Engineering, Poland

This paper is to present data analysis approach applied for system assessing driving performance of 1:10 autonomous car. The system was designed and implemented to enable critical analysis of behavior of robot agent autonomously operating in road-like indoor environment. It was mainly utilized during testing phase of project of 1:10 vehicle that was designed and built to compete in Carolo-Cup contest. As market introduction of fully self-driving cars is coming closer and closer, questions on safety assurance and system validation of algorithm are becoming more and more compelling. Many approaches need to be tested elaborately in non-impacting environment. It is crucial to validate not only whether computer vision algorithm is able to extract and recognize properly objects on the road, but also how steering system reacts in border conditions or in case of implausible input. Small scale road simulating indoor environment is suitable space to carrying on verification tests of new approaches. Designed behavior-monitoring system consists of two data gathering parts: onboard robot monitoring system and external vision system. Crucial car parameters like actual speed, position of direction position, IMU data are logged and transferred outside in continuous manner. This data connected with externally monitored car position on the road lane make it possible to assess quality of driving. Data-driven approach was proposed for discovering optimal terms for internal robot controllers. Software implementing multi-criteria optimization generates output that enabled very robust tuning of controlled vehicle. Using generic parameters like orientation, position and linear speed make the system auspicious for being reusable in other projects.

16:00-16:15 (CE057) Mobile Robot Path Planning Based on Improved Artificial Potential Field Method

Siming Wang, Tiantian Zhao and Weijie Li

Automation and Electrical Engineering, Lanzhou Jiaotong University, China

To solve the obstacle avoidance problem of mobile robots in dynamic environment, this paper proposes an improved artificial potential field method to solve the problems such as the unreachability of target points, the slow convergence speed, and the inability to avoid obstacles in real time when traditional artificial



potential field methods are used in path planning. The improved algorithm can solve the target point inaccessibility problem by satisfying the robot real-time path planning by introducing the virtual target point and changing the repulsive field function. The simulation results show that compared with the traditional artificial potential field method, the robot can jump out of the local extreme point. The feasibility and effectiveness of the improved algorithm proposed in the dynamic environment to complete the path planning.

Session B-1

“Computer Science and Control Engineering”

Chair: Zhiqiang Zhang, National University of Defense Technology, China

VENUE: Room 308

- 14:00-14:15 (CE038) Delay-dependent Stability Analysis for Polynomial Fuzzy Systems with Time-varying Delay via Delay-partitioning Approach
- Jiafeng Yu, **Qinsheng Li**, Chunsong Han
Marine Engineering College Jiangsu Maritime Institute, Nanjing, China
- For polynomial fuzzy system with time-varying delay, this paper presents a new delay-dependent stability criteria via delay-partitioning approach. The stability analysis for the augmented systems of the polynomial fuzzy systems with time-varying delay employ parameter-dependent Lyapunov-Krasovskii functional. All the conditions in the proposed approach can be represented as sum-of-squares (SOS) problems.
- 14:15-14:30 (CE046) Code Authority Control Method Based on File Security Level and ACL in WebIDE
- Junhuai Li, **Wenchao Ji**, Jubo Tian, Huaijun Wang and Kan Wang
Xi'an University of Technology, China
- WebIDE as an online integrated development environment, easy to create security issues due to authority control. Aiming at the problem of authority management between user and code file in WebIDE, a code file permission control method based on file security level and ACL is presented. The security level of the file is divided, and the mapping relationship between the security level and the file is constructed; then, an authorization code is generated according to the rules, authorizing it to any devices according to the security level and the expiration time. Finally, the ACL policy is used to bind the user to the device, and to implement the mutual constraint and control of the permissions between users, devices, and files. The experimental result demonstrates that the method has the characteristics of high safety and good performance.
- 14:30-14:45 (CE048) A New Instance-weighting Naive Bayes Text Classifiers
- Yongcheng Wu**
Jingchu University of Technology, China
- It is shown in recent research that naive Bayes text classifiers have achieved noticeable classification performance despite its strong assumption of conditional independence among features. In order to weaken this unrealistic assumption and improve the classification accuracy, there are generally three methods: structures manipulating, features manipulating, and instances manipulating. Instances manipulating can be further divided into instance-weighting and instance-selecting. In this paper, we propose a new instance-weighting approach to naive Bayes text classifier. In this new approach, the training dataset is firstly divided into several subsets according to their class value. Then every training

instance in a subset is weighted according to the distance between it and the mean of the training subset. The experimental results on 15 text document datasets show that in terms of the accuracy of classification, our method performs better than three existing naive Bayes text classifiers.

14:45-15:00 (CE053) A dictionary learning algorithm for gene expression profile classification based on feature selection

Zhiqiang Zhang, Yonggang Lu and Shaoliang Peng

College of Computer Science National University of Defense Technology, China

Classification of gene expression profiles has become an important means of cancer classification. As a new machine learning method, dictionary learning has become more and more popular in the classification of gene expression profiles. In this paper, we propose a new dictionary learning framework based on feature selection. We first use training samples and their tag information to select those key gene sets that are useful for classification. And we believe that these key gene sets are equally applicable to test samples. The process of dictionary learning is also based on these key gene sets. In dictionary learning, we train a sub-dictionary for each class of samples, and we also train a projection matrix P that can expand the distances of different classes of samples. Both of these operations can increase the final classification discriminability. The final experimental results show that our framework performs better classification performance on multiple data sets than other current dictionary learning methods and other machine learning methods.

15:00-15:15 (CE064) Research on Control Strategy in Wireless Location System

Shaohua Chen, **Meiling An**

School of Electrical Engineering, Dalian Jiao tong University, Dalian, China

This paper studies the system control strategy in order to realize the function of wireless positioning system to meet the requirements of workshop production management. The quality of the positioning algorithm is the key to the positioning performance of the system. Therefore, particle filtering is applied to the RSSI ranging of DV-Distance. In order to model the cumulative distance from the device to the beacon node in the DV-Distance location calculation, the particle swarm algorithm is used to optimize the DV-Distance location calculation method. In order to satisfy the positioning of the equipment to a specific workbench, deeper improvements are made to the system control strategy. Finally, it introduces the idea of coordination for RFID device positioning. The simulation of the positioning performance before and after the improvement of the equipment positioning was performed and compared. It was confirmed that the improved wireless location system function achieved the requirements of workshop site management.

15:15-15:30 (CE066) Research on Control Strategy in Wireless Location System

Jingyi Feng, Haifeng Wu, Yu Zeng

School of Electrical and Information Technology, Yunnan Minzu University, China

In this paper, we will study the problem that the location of a macaque's moving finger is decoded through neuron spike signals in its motor cortex. In traditional neural decoding methods, supervised learning is more popular because their decoding accuracy could be guaranteed. However, this paper proposes a weak supervised learning (WSL) method to decode the location of a macaque's moving finger and an unsupervised deep learning model, generative adversarial network (GNA) is introduced to optimize a



training model and ultimately achieve an accurate estimation of the finger movement trajectory. In experiments, we use public data to evaluate the decoding performance of the proposed method. The experimental results show that this WSL method has higher accuracy of the location decoding.

15:30-15:45 (CE073) Neural Decoding for Location of Macaque's Moving Finger Using Generative Adversarial Networks

Caizhi Liu, Yanxiu Sheng, Zhiqiang Wei and Yongquan Yang

College of Information Science & Engineering, Ocean University of China, Qingdao, China

In recent years, with the rapid development of Internet Technology, text data is growing rapidly every day. Users need to filter out the information they need from a large amount of text. Therefore, automatic text classification technology can help users find information. In order to address problems, such as ignoring contextual semantic links and different vocabulary importance in traditional text classification techniques, this paper presents a vector representation of feature words based on the deep learning tool Word2vec, and the weight of the feature words is calculated by the improved TF-IDF algorithm. The word weight and Word2vec word vector are weighted to realize the weighted Word2vec word vector representation. Finally, each text is represented by accumulating all the word vectors. Thus, text classification is carried out. Experimental results show that the improved TF-IDF algorithm has a higher classification accuracy compared with the traditional TF-IDF algorithm.

15:45-16:00 (CE009) Realization of 3D Stereo Imaging for Underwater Applications

ChiCheng Cheng, HaoTing Yang

Department of Mechanical and Electro-Mechanical Engineering, National Sun Yat-Sen University, Kaohsiung, Taiwan, R.O.C.

With the help of flourishing advancement of display technology, the 3D stereoscopic video display is growing especially in entertainment markets. Relying on one single camera, underwater surveillance and operations have been suffering from lacking depth information. This research aims at establishing the 3D stereoscopic vision for inspection and operations in underwater environment. Two sets of parallax images acquired by dual cameras are first combined and interlaced via image processing techniques. Then 3D stereoscopic imaging can be implemented with a 3D television screen accompanied by a pair of polarizing glasses. In order to determine the most appropriate stereo base and underwater viewing distance, a series of observation experiments with human subjects were conducted on examining the 3D effect and the viewing comfortableness. It is highly expected that realization of 3D stereo imaging provides significant enhancement on performance and efficiency of underwater operations and inspection.

Session A-2

"Image Processing and Computer Vision"

Chair: Xiaofeng Lian, Beijing Technology and Business University, China

VENUE: Room 312

16:30-16:45 (CE005) High Confidence Updating Strategy on Staple Trackers

Qian Zou, Shaofu Lin, Yanan Du

School of Software Engineering, Beijing University of Technology, Beijing, 100124, China

In the visual tracking, correlation filtering (CF) based on tracking algorithms have shown favorable performance in recent years, and have the impressive performance on benchmark datasets. However, the tracking model has limited information about their context and can easily drift in cases of fast motion, occlusion or background clutter, and the trackers update tracking models at each frame without

considering whether the detection is accurate or not. In this paper, we present an improved strategy that is adding more background context and changing the tracker model updating strategy. Experimental results show that the performance of the model has been improved effectively.

- 16:45-17:00 (CE010-A) Feasibility analysis and Application of the application of 4G-LTE technology in vehicle-ground communication of the modern tram

Tao He, Tong Zhao

Lanzhou Jiaotong University, China

The modern tram is the representative of the traffic in the new era. According to the modernized demand of the tram and the bidding documents of the project, In addition to meeting the basic information transmission of train operation, vehicle to ground communication also needs to transmit high-definition surveillance video, audio, richer passenger information and other information. At present, the main way of communication is WLAN. Comparing its WLAN to 4G-LTE technology, WLAN technology has been unable to carry these new service requirements. We put forward that 4G-LTE technology is an inevitable trend in the communication system of tram. And in the 4G-LTE network environment, according to the characteristics of trams, simulating the signal transmission. Comparing the simulated data with the demand indicators, it shows that 4G-LTE technology can meet the needs of HD video surveillance and other services under the operation of trams. Giving the network architecture of the whole 4G-LTE trolley car land communication system. And according to the actual problems brought back from the Guangzhou test section, put forward the concrete improvement method.

- 17:00-17:15 (CE072) Image Retrieval Based on a Hybrid Model of Deep Convolutional Encoder

Jingkun Qin, Haihong E, Meina Song and Zhijun Ren

School of Computer Science, Beijing University of Posts and Telecommunications, China

Aiming at the difficulty of semantic gap in content-based image search (CBIR), inspired by the convolutional neural network (CNN) in image classification and detection, this paper proposes a simple and effective hybrid model of deep convolutional network and autoencoder network. This model uses the CNN network to extract the high-level semantic features of the image, then uses the depth autoencoder network to reduce the dimension of the extracted image features, and compresses the features into a 128-bit vector representation. Nearest Neighbor Search (ANN) is an effective strategy for large-scale image retrieval. This paper uses the annoy algorithm to calculate the similarity between the query image and the index tree, and outputs them in descending order of similarity.

- 17:15-17:45 (CE1002-A) Semantic Visual Localization and Mapping Based on Deep Learning in Dynamic Environment

Linhui Xiao, Jinge Wang, Xiaosong Qiu, Zheng Rong, Xudong Zou

Institute of Electronics, Chinese Academy of Sciences, China

Localization and mapping is one of the most critical technologies in intelligent mobile robots. When working in a dynamic environment, the traditional Simultaneous Localization and Mapping (SLAM) performs poorly in terms of estimation accuracy and system robustness due to interference from dynamic environmental objects. In our work, by taking advantages of deep learning in object detection, we propose a semantic simultaneous localization and mapping framework named Dynamic-SLAM, in order to solve the problem of localization and mapping in dynamic environment for mobile robots. On the one hand, based on the convolutional neural network, we construct an SSD object detector which combines



the prior knowledge to detect the dynamic objects from the semantic level. On the other hand, in view of the low detection recall rate of the existing SSD object detection network, we propose a misdetection compensation algorithm based on the speed invariance in adjacent frames, which greatly improves the detection recall rate of the object detection network. On the basis of these two parts, we build an object detection module and a semantic correction module, and then integrate these two modules into the existing SLAM system framework. Finally, we construct a feature-based visual SLAM system to eliminate the feature points of the dynamic object in the tracking thread, thereby reducing the error of pose estimation caused by mis-matching. Experiments show that the detection recall rate of our system is increased from 82.3% to 99.8% in the TUM dataset compared with the original SSD object detection network. In the indoor dynamic environment dataset experiment, the localization accuracy is 22.6% higher than the current state-of-the-art ORB-SLAM2 system, and the operation speed is improved by 10%. In the outdoor large-scale dynamic environment mobile robot experiment, our system successfully localizes and constructs an accurate environmental map, while ORB-SLAM2 fails. Experiments have verified that our framework has good accuracy and robustness in robot localization and mapping.

17:45-18:00 (CE032) Product Surface Defects Detection Based on Multiple-Kernel Learning Feature Fusion Method

Han Jia, Xiaofeng Lian

Beijing Technology and Business University, China

In order to achieve high accuracy and real-time requirement for product surface defect detection during the process of modern industrial production, a multi-feature fusion method based on Multiple-Kernel-Learning (MKL) is proposed. Firstly, HSV(Hue Saturation and Value) and SIFT(Scale-invariant feature transform) feature are extracted from the real-time acquisition of images, as well as the Multi-scale Equivalent Pattern Local Binary Pattern (MEP-LBP) feature presented in this paper. Secondly, according to the MKL method, three suitable kernel function were selected to train and classify of various defects. At the same time, in the process of detection, the multi-scale sliding window is generated according to the accuracy requirements of different surfaces in the captured images, so as to improve the detection performance. Experiment results show that the proposed method can meet the high accuracy requirements and ensure the real-time demand for industrial production detection.

18:00-18:15 (CE055) Recognizing human actions using 3d motion trail model

Song Wang, Jianwu Dang, Yangping Wang, **Lixia Liu**, Zhenhai Zhang

Lanzhou Jiaotong University, China

In this work, a novel descriptor is proposed for 3D motion trail model. The proposed descriptor is used to describe the motion pattern contained in the three dimensional motion trail. Key poses are selected in order to reduce the computational burden of the 3D motion trail model. Specifically, we employ three dimensional motion trail model to represent movements. In order to speed up the computation of 3DMTM, the key poses are selected according to the kinetic energy of joint motion. Finally, Kernel extreme learning machine is used to classify the action video. Experimental results show that the proposed method achieves better results on MSR Action3D dataset than the existing method.

Session B-2

“Electrical engineering and automation”

Chair: Yuanshan Lin, Dalian Ocean University, China

VENUE: 313

16:30-16:45 (CE012) Probability Model of Traction Load Using Histogram Density Estimation Based on Optimal

Binwidth

Yulong Che, Xiaoqin Lv, Xiaoru Wang, Zhenli Lin, Kun Jiang

School of Electrical Engineering, Southwest Jiaotong University, Chengdu, China

Histogram is one widely used nonparametric estimation method. The shape of histogram probability density is affected by the width of bins. The measured data of traction load feeder currents and power factor have many spikes due to its fluctuation and impact. After trying a few times to change the bin size by the general rule of thumb, the appropriate probability density of traction loads can be obtained. This is laborious and without theoretical basis. This paper proposes the cost function of mean integrated squared error (MISE) to find the optimal binwidth. This method is used to establish the probability density histogram for traction load feeder currents and power factor. The probability modelling for traction load feeder currents and power factor based on histogram density estimator using optimal binwidth is labor-saving and more suitable. The best histogram obtained by this method has mathematical support when other parameter or non-parameter estimation methods are compared with the histogram.

16:45-17:00 (CE2002) Wind turbine condition assessment method based on variable weight theory and fuzzy comprehensive evaluation

Haiying Dong, Kelei Xu, Lixia Yang, Hao Zhang

Lanzhou Jiaotong University, China

In view of the complicated and variable operation state assessment of wind turbine operating conditions, a state assessment method based on variable weight theory and fuzzy comprehensive evaluation strategy is proposed. This method fully considers the complicated and variable operating conditions of wind turbines, the model based on variable weight theory and fuzzy comprehensive evaluation strategy was established. The state parameters of the wind turbine subsystem are comprehensively evaluated by introducing deterioration degree, and the degree of deviation of each state parameter from its normal range is quantified. On this basis, according to the theory of variable weight, the weights of some state parameters that seriously deviate from the normal range are corrected. Finally, this method was applied to the evaluation of a 1.5 MW wind turbine in Gansu Province. The results show that the method of wind turbine based on the variable weight theory and fuzzy comprehensive evaluation can evaluate the operating state of the unit, and provide the basis for the establishment of the unit maintenance and maintenance plan.

17:00-17:15 (CE076) Pixel-to-action Policy for Underwater Pipeline Following via Deep Reinforcement Learning

Yanan Liu, Fang Wang, Zeyu Lv, Kaihui Cao, **Yuanshan Lin**

Dalian Ocean University, China

In this paper, we investigate the problems of vision-based pipeline following for a fully actuated autonomous underwater vehicle (AUV) that moves in the horizontal plane. The problems cannot be solved by most of model-based approaches. To this end, we firstly formulate the pipeline following problems for AUVs as continuous-state, continuous-action Markov Decision Processes (MDPs) under unknown transition probabilities. The pipeline following policy is modeled as a mapping from the images produced by the cameras to the velocity of AUVs, and is represented by deep neural network. And then we use Proximal Policy Optimization (PPO) to train the network, obtaining a pixel-to-action policy. Finally, we construct several experiments to verify the effectiveness of the presented approach and the generalization ability of the learned policy. The simulation results show that the learned policy can control the AUV following the



pipelines, and have great generalization ability for new and unseen pipeline geometries.

17:15-17:45 (CE078) High Speed Digital Data Interface for OLED-on-silicon Micro-Display

Jun Cai, Xiaofeng Chen, Yuan Ji
Anhui University of Science and Technology, China

Micro-displays with low power consumption and good display quality is required in near-eye displays. High data rate character is much important for high definition microdisplay. An OLED-on-silicon display with digital data interface was fabricated in TSMC 0.18 μ m CMOS process, which employs eight high speed LVDS data input channels and one LVDS clock channel to decode the parallel 64-bit digital data. Each pixel uses a RGB layout pattern. The micro display chip achieves a high-resolution image of 1600 \times 1600 dot matrix resolution and a light intensity more than 1000cd/m².

Technical Program (Poster Presentations)

Poster Presentation

VENUE: Room 302, Convention Center, Education & Technology Building (Outside)

Chair: Wang Fuping, North Minzu University

Time: 10:25-11:00

(CE007) Traffic Flow Modeling and Simulation Based on A Novel Cellular Learning Automaton

Yong Chen, Hong He , Ning Zhou

School of Electronic and Information Engineering, Lanzhou Jiaotong University, Lanzhou, China

A novel cellular learning automaton traffic flow model is proposed to solve the problem that the probability of randomization in the NaSch model is not consistent with the actual traffic. The learning mechanism is introduced in this model. Cellular can learn traffic information from cellular neighbors in real time. The traffic environment information, such as, relative speed and safety distance will be cellular parallel ruler through the randomization probability form after learning. Finally through numerical simulation, the space-time characteristics were obtained, and comparison with the NaSch model is analyzed. The results show that the improved model can reduce the blocking the road to a certain extent and traffic jam dissolving efficiency is higher. The stability analysis of vehicle running from two aspects of speed fluctuation and headway fluctuation shows that the method in this paper can make traffic flow more stable.

(CE015) Study on Dynamic and Switched Control System of Arterial Traffic Signal Based on Multi-Agent

Chuandong Ding, Zian Tang, Minan Tang

Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou Gansu 730070, China

This article is based on the multi-agent technology, The structure framework of the dynamic and switched control system for arterial traffic signal system based on multi-agent is constructed. The intersection phase agent, the switching control agent and the arterial coordinated control agent are respectively designed, and the fuzzy inference module to realize each agent's intelligence is introduced in detail. In this system structure, the chaos genetic algorithm is applied to optimize the fuzzy membership function of intersection phase agent in real time to make it possess the ability of self-learning and improve the dynamic performance of the system, and the switching control agent is introduced to optimize the ordering of phases. Using mat lab simulation software, simulation experiments were carried out for three consecutive intersections of arterial. The average queue length curve of vehicles at the intersection under different control methods is given. The results show that the proposed method has better control effect.

(CE017) Application of High-Order Sliding Mode variable structure Control based on Power- function in Doubly Fed Induction Generator

Qiangwen Li, Qingfang Teng, Yiseng Wang, Xiping Ma

Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou, Gansu, 730070, China

A high-order sliding mode variable structure control strategy for rotor side converter of doubly-fed wind power system is proposed in two-phase stationary reference frame ($\alpha\beta$ -frame) to realize maximum power-point tracing by analyzing the mathematical model of doubly-fed induction generator(DFIG) .The control strategy adopts double closed loop structure. External loop is power loop ,which adopts stator voltage orientation control vector control method. And its control structure is mature and stable , control performance is good and robustness is strong. The inner loop is current loop, which adopts a high-order sliding mode variable structure control method to control the voltage reference value of the rotor. Advantages of the method is that the dynamic response is relatively strong and the robustness is good. The proposed high-order sliding mode variable structure control strategy can not only realize the decoupling of active and reactive power of the doubly-fed wind turbine, but also improve the anti-interference performance of the speed control of the power generation system, and ultimately realize the maximum power point tracking and stable control .Finally, the correctness and validity of the proposed control strategy are verified by matlab / simulink simulation results.

(CE019) Research on Assembly Sequence Planning Based on Fluid Flow Mechanism

Xiaoyu Hu, Bo Gao

School of Mechanical Engineering, Lanzhou Jiaotong University, Lanzhou 730070, China

To deal with assembly sequence planning (ASP) of complex products in manufacturing, a novel assembly sequence planning method based on intelligent water drops (IWD) algorithm is proposed. Constructed assembly planning model adopted the constraint matrix and the orthogonal interference matrix. The fitness function is constructed by the amount of soil carried by the water-drops, which are related to the similarity between the assembly units. The assembly parts are associated with the nodes in the flow path of the IWD algorithm. Assembly planning is global searched in the noninterference solution space. By continuously reducing the amount of soil on the flow path, the assembly sequence is continuously optimized, and finally a better assembly plan is obtained. Assembly planning process of the typical gear pump is illustrated to prove the feasibility and effectiveness of the proposed method in ASP problem.

(CE022) Passive Control of Permanent Magnet Direct Drive Wind Power Generation System Based on ESO

Changle Li, Qingfang Teng

Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou Gansu 730070, China

Considering the influence of internal parameter perturbation on the speed regulating performance of permanent magnet synchronous direct drive generator, the mathematical model of Permanent Magnet Synchronous Direct Drive Generator (PMSG) is studied from Hamiltonian energy and robustness. First, the mathematical model of port-controlled Hamiltonian system (PCHD) of PMSG system is deduced. Secondly, based on the principle of energy forming, PCHD and the extended state observer (ESO) technology, a passive current controller based on ESO is designed. In order to simplify the control algorithm and reduce the electromagnetic torque ripple, the system disturbance term is observed and compensated by ESO based on the inverse hyperbolic sine function. The simulation results show that this control method can ensure the stable operation of the system. It has strong speed tracking capability, load capability and robustness as well as has small electromagnetic torque ripple.

(CE024) Model Predictive Torque Control For PMSM Driven by Three-level Inverter Based on Extended Kalman Filter Speed



Observer

Xiao Han, Qingfang Teng, Weiduo Luo

Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou Gansu 730070, China

Based on the extended Kalman filter algorithm, a non sensor model predictive torque control strategy is proposed for the permanent magnet synchronous motor (PMSM) driven by three-level inverter. The method of MPTC is proposed in order to reduce the torque and flux ripple and improve the control performance of the system, the speed observer based on the extended Kalman filter algorithm can realize the online observation of motor speed and enhance the robustness of the system. Compared with the traditional sliding mode speed observer, the observer is more simple and easier to implement. Also, the observer reduces the ripple of the motor speed in high frequency range in an efficient way. The control strategy in this paper can make PMSM MPTC system have better control performance, stronger robustness and good dynamic performance. The simulation results validate the feasibility and effectiveness of the proposed scheme.

(CE025) Research on Inverse Kinematics of Robot Based on Motion Controller

Fuping Wang, Zhengjun Zhao

North Minzu University, Innovation and Entrepreneurship College, Yinchuan, China

Based on kinematics principle, combined with trigonometric function and geometry, an inverse kinematics analysis algorithm for two-degree-of-freedom (SCARA) robot structure is derived, which is tested and verified by PMAC multi-axis motion controller. The test results show that the analytical algorithm can effectively realize the inverse kinematics solution of the robot mechanism, and user can accomplish corresponding trajectory motion by programming the robot end actuator coordinate position. The robot control system based on motion controller proposed in this paper can meet the requirements of robot system openness in robot teaching and scientific research. The analytical process and method of inverse kinematics studied in this paper can be flexibly extended to the motion control of other kinds of robots.

(CE028) Adjustment of Train Interval Time Based on Dynamic Programming Algorithm

Shenglin Gao, Yunshui Zheng

School of Automation & Electrical Engineering, Lanzhou Jiaotong University, Lanzhou, China

The optimization of the tracking interval time is the main research field for improving the railway transportation capacity. At present, tracking interval time of high-speed railway has basically reached the 5-minute or 3-minute in China. To further shorten the train tracking interval time, this paper selects the line gradient parameter as the optimization parameter to establish the multi-stage decision model based on dynamic programming, and uses COADP algorithm (an improved algorithm based on dynamic programming) to optimize the braking distance of the train. Basing on Bellman's theorem, the COADP algorithm optimizes the line gradient reduction program and solves the phase variable optimal solution, state variable optimal solution, optimal decision sequence, optimal index function and optimal value function. By obtaining the optimal objective function of the EMU braking distance, the algorithm optimizes the tracking interval time of EMU and enhances the high-speed railway transportation capacity.

(CE034) Energy Consumption Modeling and Energy Saving Analysis of Supercapacitor Tramcar

Lin Chen and **Chenlong Sun**

The Electrification Company of CCCC Tunnel Engineering Co., Ltd, China

As an emerging urban public transport, energy storage trams are the major electricity consumers in the city. Most of the trams use distributed power supply, and the traction substations are derived from the urban mediumvoltage network. Therefore, it is of great significance to establish a model that can predict the energy consumption distribution at each site. Existing models mostly use regression methods, focusing on analyzing the correlation between various influencing factors

and energy consumption, and forecasting the total energy consumption of tram lines through a large amount of statistical data. Analyze the complete operation process of the tram between the stations, use MATLAB/Simulink to build its operation model, simulate the operating conditions of the tram, and obtain the traction energy consumption model of the energy storage tram. Regarding the vehicle air conditioning energy consumption model, the vehicle energy consumption model was further obtained. By verifying the model with the existing operating data, the error is within the allowable range, which has certain practicality and provides a basis for energy-saving analysis.

(CE035) Design and Implementation of Energy Consumption Data Collector for Tram Stations

Xiaoxiang Tang and **Qiwei Ren**

CCCC Tunnel Engineering Bureau Co, Ltd., China

Energy consumption acquisition is an important part of energy conservation management, combined with the real-time requirements for the automatic collection of energy consumption data in modern tram stations. According to the characteristics of energy consumption in tram stations, the method of energy consumption data collection based on DSP as the embedded real-time acquisition system is proposed. First, the TMS320F28335 series 32-bit floating point DSP controller is used to collect and store the main energy consumption data of the tram station. Then, ZigBee technology is used to carry out energy data transmission, remote configuration, and hardware fault tolerance to achieve dynamic detection of data to determine the existence of faults; Finally, use LabVIEW for software development. Design tram data station data acquisition system with energy consumption data acquisition monitoring and data processing analysis. Compared with the traditional energy consumption data collector, it has the characteristics of good real-time performance, high data acquisition accuracy, and strong anti-interference, and provides a powerful source of data for station energy monitoring and management. Realize the functions of collection, storage, analysis, transmission, diagnosis and maintenance of energy consumption data for smart tram stations. It is helpful to improve the efficiency of energy-saving management of tram stations. This study further provides a certain reference for the energy management of tram stations.

(CE036) Research on energy consumption data analysis method of tram system

Lin Chen and Dongping Wang

China Railway Tunnel Bureau Electrification Engineering Co., Ltd., China

In view of the traditional tram energy consumption analysis method be lack of judge and analysis of abnormal data as well as is difficult to effectively discover the characteristics of energy consumption data and the potential relationship between data, an integration method of tramcar energy consumption analysis with control charts and grey correlation analysis is proposed. By using the control chart to analysis the fluctuation of energy consumption data , and using the grey relational data analysis algorithm, the tram energy consumption analysis method proposed in this paper can better analyze the characteristics of all energy consumption data and mine potential relations among data, The energy consumption analysis method of trams can better monitor the fluctuation of energy consumption data and identify the abnormal energy consumption data as well as related factors that affect energy consumption, providing auxiliary decision-making for energy saving of tram system. Through the simulation experiment, the effectiveness of the integrated method is verified, which can provide some reference for the analysis of the energy consumption data of the running tramcar.

(CE037) Research on Effectiveness Evaluation Method of the Integrated Naval Gun and Laser Weapon System

Weiye Chen, **Guoqiang Liu**, Huadong Liu, Han Cheng

Department of Ordnance, Naval University of Engineering, Wuhan, China

In the design of the demand for the integrated naval gun and laser weapon system, combined with the technical characteristics of the naval gun weapon system and laser weapon system, the influence factors of interference



confrontation were introduced based on the traditional evaluation model. The evaluation index system of the integrated naval gun and laser weapon system and the improved evaluation model were established. Meanwhile, in view of the complexity of operational indicators of the integrated naval gun and laser weapon system, the analytic hierarchy process and set pair analysis method were used in the comprehensive treatment of the evaluation index. The analysis showed that the improved model could effectively reflect the integrated operational effectiveness of practical environment and could provide more practical support for the development of the integrated naval gun and laser weapon system future.

(CE039) Energy Consumption Prediction of Trams Based on Grey Relational Analysis and Regression Model

Zhipeng Yan, Yongzhi Min

Lanzhou Jiaotong University, Lanzhou, China

Aiming at the lack of quantitative analysis of the significant factors affecting the energy consumption of traditional tramway system energy consumption prediction methods, this paper proposes a method for predicting the energy consumption of trams based on the grey correlation analysis method and multiple linear regression model. The grey relational analysis method is used to calculate the correlation degree of energy influencing factors, and then the factors that have more significant impact on energy consumption are selected as the model input variables to establish the tram energy model. The experimental verification shows that the prediction method proposed in this paper can more accurately predict the energy consumption of trams and provide some references for the energy conservation management of trams.

(CE042) Inertial Navigation System Calibration based on Direction Cosine Matrix Matching

Fangjun Qin, Lubin Chang, Sai Jiang

Department of Navigation Engineering, Naval University of Engineering, Wuhan, China

This paper proposes an attitude transfer alignment method using direction cosine matrix (DCM) matching for Inertial Navigation System Calibration. The relationship between the calculated attitude DCM by inertial navigation system and reference attitude is established, which is used as measurement model for attitude transfer alignment. The validation of the proposed model is demonstrating in the Inertial Navigation System calibration. In order to calibrate the error parameters such as gyro drift, accelerometer bias, installation errors and the scale factor errors, a system-level calibration model with 18-error parameters needs to be established. By dimensionality reduction of high-dimensional system, 18-error parameters are effectively coupled into 6- error parameters. An 10-position "stationary" calibration scheme is designed and a 12-dimensional Kalman filter equation is established. The experimental results show that the accuracy of the error coefficient calibration of Inertial Navigation System is improved effectively after the addition of high-precision attitude information. The relative errors of gyro drift and accelerometer bias are less than 0.1%.

(CE2001) The Study on Fabrication of Solid Metal Microneedles Based on Optimized Process of Electrochemical Etching and Cutting

Zhibiao Li, Xiaoxiao Yan, Min Hu, Gang Tang, Zhichun Li

Jiangxi Provincial Key Lab of Precision Drive and Control, Nanchang Institute of Technology, Nanchang, China

The use of microneedles to transport drugs to organisms is an important way of transdermal delivery, and the preparation of microneedles is the key to its realization. In this paper, metal microneedles are prepared through a combined method of cutting and electrochemical etching whose parameters are optimized as well. It is studied first in the paper the influences of the electrochemical machining parameters, which is optimized as well, on the shape of metal microneedles, and then the influences of the cutting method on the rough shape of the stainless-steel needle bodies. The conical shape is easily to be obtained through cutting with bevel-cutting tools. A short time will elapse for forming sharply-tipped needles with a uniform

shape by electrochemical etching method.

(CE047) The Deep Neural Network Algorithm Based on Meteorological Features is in the Medium and Long Term

Tengfei Wang, Gang Li, Cao Wu

Mechatronics T&R Institute, Lanzhou Jiaotong University, Lanzhou 730070, China

In order to improve the prediction accuracy of medium and long term wind speed, the deep neural network algorithm is applied to the medium and long term wind speed forecasting in this article. Automatically extract the pattern of wind speed change through powerful nonlinear mapping ability of deep neural networks. In the specific process, take historical wind speed and meteorological as input, deep convolution neural network framework is used to train the model. Through the deep structure of the network, we can learn the internal relationship between the sequences and achieve the prediction of the future wind speed series. The effect of the results is perfect after verification. The prediction result of wind speed in some wind field in Ganhekou of Gansu Province shows, the wind speed prediction deviation of the two models of CNN+MLP and CNN+LSTM are at a relatively low level in most cases. Compared with the traditional weather forecast, improved accuracy of prediction, better acceptance of the abnormal data, and stronger generalization ability of the model. In summary, this method has certain practical value.

(CE049) Co-simulation Research Based on Position Tracking of Quadrotor Vehicles

Dong Zhai, Xiangju Jiang, Wei Peng

Department of Automation and Electrical Engineering, Lanzhou Jiaotong University, Lanzhou, China

Quadrotor vehicles have are used in many applications for their distinct advantages over other unmanned air vehicles(UAVs), Position tracking control is a very important issue of the quadrotor vehicle's attention. This paper proposes a method of combining automatic dynamic analysis of mechanical systems with Matlab/Simulink, and establishes a virtual prototype model of Quadrotor vehicles with real properties of controlled objects. The effectiveness of the designed multi-loop sliding mode PID controller is verified by joint simulation and compared with the traditional PID position tracking control simulation results. Simulation results show that the Co-simulation results can avoid the cumbersome derivation process of traditional mathematical modeling and prove that the position tracking control strategy can effectively track the expected position of the Quadrotor vehicles, and the maximum overshoot and response time are obviously better than the traditional ones.

(CE056) Modelling and Control of Fully Constrained Cable-driven Parallel Mechanism As a Marine Salvage Device

Yiliang Tong, Jingfeng He

Dept. School of mechatronics engineering, Harbin Institute of Technology, HIT, Harbin, China

A Marine salvage device generally requires the operation can be carried out under the interference of waves and wind in rough ocean circumstances. This paper presents a fully constrained cable-driven parallel mechanism as a salvage device with low self-weight, high speed and large workspace. It controls the motion of the moving platform through eight cables which should always being in tension to prevent the sagging and remain rigidity of the mechanism. In this paper, the integrated dynamic model of this cable-driven parallel mechanism first be derived and the control scheme then be developed. To retain cable tensions positive, avoiding loose or sagging, a closed-form force distribution method is employed. In the end, simulation results validated the effectiveness of modeling and force distribution control.

(CE3002) Design, Analysis and Experiment of A Non-humanoid Arm Exoskeleton for Lifting Load

Xin Li, Zhengwei Jia, Xiang Cui, Lijian Zhang



Research Center of Human Performance Modification Technology, Beijing Institute of Mechanical Equipment, Beijing, China

Aiming to the interference with human body problem of the traditional arm exoskeleton, a non-humanoid arm exoskeleton is presented. The non-humanoid arm exoskeleton has a larger motion space, which is 20.8% more than the humanoid arm exoskeleton. The statics of the nonhumanoid structure is analyzed. The minimal interaction force control strategy between the arm exoskeleton and human is used in the control system for lifting load experiment, and the subjects can lift the load of 5Kg easily. Additionally, the response time of adjusted control system reduce 86.25% according the control system without PID.

(CE059) PMSM Vector Control Based on Improved ADRC

Fujun Deng, **Yunpeng Guan**

Department of Electrical and Information Engineering, Dalian Jiaotong University, Dalian, Liaoning, 116000, China

This paper research a vector control strategy of PMSM based on ADRC technology. That is, using the vector control method, an ADRC is designed for the speed control loop of the PMSM to replace the PI controller. At the same time, in order to facilitate the parameter adjustment of the ADRC, some improvements are made to the typical structure of the ADRC, and the simplified ADRC is applied to the PMSM vector control system. To improve the PMSM speed control performance. Simulation results show that the above control strategy is feasible.

(CE065) One-shot Learning Gesture Recognition Based on Evolution of Discrimination with Successive Memory

Xiaojie Li, Shiyin Qin, Kuanhong Xu, Zhongying Hu

School of Automation Science and Electrical Engineering, Beihang University, Beijing, China, 100191

In this paper, a one-shot learning gesture recognition algorithm based on evolution of discrimination with successive memory is presented, which utilizes the transferability of large-scale pre-trained DNN (Deep Neural Network) gesture recognition model and distance discrimination to carry out high-performance recognition with evolutionary discrimination. Our scheme can be narrated as follows. Firstly, a DNN gesture recognition model is proactively trained by a sample set with 19 classes of BSG dataset as a transferable model with its powerful extractor of features. Secondly, the transferable capacity of extractor is employed to extract features of labeled root samples and test samples respectively towards one-shot learning gesture recognition so as to achieve a high performance feature extraction and structured arraying. Finally, the discriminative recognition can be carried out with Euclidean distance measure between the root features and test features. Meanwhile a mechanism of updating and evolution of root features memory is built and utilized for one-shot learning gesture recognition so as to enhance the performance of recognition. A kind of software for online one-shot learning gesture recognition towards practical applications is designed and developed to achieve outstanding performance with fast response speed and high recognition accuracy. A series of experiments on the additional 10 classes of BSG dataset are conducted to verify and validate the performance advantages of our proposed one-shot learning gesture recognition algorithm.

(CE068) An Automatic Meter Reading Method Based on One-dimensional Measuring Curve Mapping

Xiaoming Mai, Wensheng Li, Yan Huang, **Yingyi Yang**

Department of Artificial Intelligence and Robotics, Electric Power Research Institute of Guangdong Power Grid Corporation, Guangzhou, China

Take advantage of the good matching performance of scale-invariant feature transform (SIFT) features between multiple images about a textured object, our automatic meter reading method calculates a homography matrix H between the template image and the test image, uses random sample consensus (RANSAC) to filter out false matches, ensuring an accurate H , and finally maps the measuring curve from the template image to the test image. On the path of this measuring

curve, the relationship between the pointer and the scale is calculated based on the gray scale change in the image. The pointer is detected and the reading can then be obtained using a particular formula. Our method provides rotation invariance, scale invariance and higher reading accuracy. Experimental results show the effectiveness

(CE069) Model predictive torque control of PMSM system driven by three-phase eight-switch fault-tolerant inverter

Laibao Yang, Bin Zhang

Lanzhou Jiaotong university, Lanzhou, Gansu

A novel model predictive torque control (MPTC) strategy for a permanent magnet synchronous motor (PMSM) system driven is proposed by three phase eight-switch fault tolerant inverter. The mathematical model of the three phase eight-switch inverter and PMSM is established through the running mode of the driving system; the improved MPTC strategy is used to reduce the complexity of value design, the total harmonic distortion (THD) value of the stator current, the flux and torque ripples. Meanwhile, the fault tolerant control with current feedback characteristics in this paper can effectively suppress the adverse effects on system operation caused by the maldistribution of DC side bus capacitor voltage. The simulation result shows that the method can ensure the reliable and stable operation of the eight switched fault tolerant inverter PMSM system, which not only has good dynamic performance, strong anti-interference and robustness, but also can reduce the switching loss and the total harmonic distortion (THD) value of the stator current.

(CE074) Sentence Emotion Classification for Intelligent Robotics based on Word Lexicon and Emoticon Emotions

Yunong Wu, Xin Kang, Kazuyuki Matsumoto, Minoru Yoshida, Keranmu Xielifuguli, **Kenji Kita**

Faculty of Engineering, Tokushima University, Tokushima, Japan

In recent years, the information of social network increases explosively, since more and more people like sharing their experience and giving the comments on some events to convey their attitudes by textual information which are rich in emotions. In this study, we examine the effectiveness of emoticon emotion distribution by sentence emotion classification based on word emotion lexicon and emoticon emotion distribution. We construct two word lexicons by using the word emotion intensities and frequency respectively, and calculate the emoticon emotion distribution by the co-occurrence of emoticon and sentence labels. Four experiments have been done, and result proves the emotion contribution of emoticon in emotion classification.

(CE3005) The exploration of the trajectory planning of plant protection robot for small planting crops in western mountainous areas

Jiayi Ma, Bugong Sun, Peng Zhang, Keping Zhang

Gansu Agricultural University, Lanzhou, China

Based on the arrangement of crops in crop planting in western China and the characteristics of single small area planting, the working trajectory planning method for plant protection robot in arid areas in western China is discussed. First of all, the paper analyzes the distribution patterns of west mountain characteristic planting crops; The motion path of the robot is determined according to the arrangement form of crop planting, and the working path of spray robot is simplified for the postman. Finally, the ant colony algorithm was used to solve the optimal spraying path, which provided some technical support for the application and technical promotion of agricultural robot in western hilly region.

(CE077) A Chaotic-based Digital Watermarking Algorithm for Tag Tamper Detection

Shuxu Zhao, Qingsheng Yue

School of Electronic & Information Engineering, Lanzhou Jiaotong University, Lanzhou, China



RFID tags has been used more widely, but the tag information is easy to be tampered, so its tampering detection has become a focus in order to ensure information security. An improved digital watermarking algorithm based on chaotic tent mapping has been proposed. In the improved algorithm, integer piecewise linear chaotic tent mapping has been used to improve the watermarking generating and embedding, and enhance the safety and efficiency of the algorithm, at the same time the simultaneous detection of EPC Manager and Object Class segments have been achieved. The proposed solution algorithm conforms to the EPC-Class1 Generation2 specification.

(CE079) Optimization on PVDF film force sensor for steel ball forging fault diagnosis

Yingjun Li, Guicong Wang, Huanyong Cui, Xiangyu Wang

School of Mechanical Engineering, University of Jinan, Jinan 250022, PR China

Bearing capacity and sensitivity are two important indicators of force sensor measurement performance. In this paper, the parameters optimization and performance analysis of the piezoelectric film force sensor for steel ball cold heading machine are carried out for the piezoelectric film force sensor for detecting cold ball force of steel ball. In order to avoid local stress concentration, a modified scheme of the structure of the piezoelectric film force sensor is proposed. A finite element model of the sensor was established, and then the main parameters affecting the bearing capacity and sensitivity of the sensor were simulated and optimized. The size of the sensor stress concentration area was analyzed. Finally, the optimized size parameters of the piezoelectric film force sensor were obtained, which improved the sensor sensitivity and its load capacity

(CE080) Research on Lane Detection and Tracking Algorithm Based on Improved Hough Transform

Xianwen Wei, Zhaojin Zhang, Zongjun Chai, Wei Feng

Department of Electronic Information Engineering, Wuwei Occupational College, Wuwei, Gansu Province, China

The driverless technology has developed rapidly in recent years. Unmanned vehicles need to learn to observe the road from the visual point of view if they want to achieve automatic driving, which specifically is the detection of lane lines. This includes identifying the positional relationship between the lane line and the car, whether it is a solid line or a dotted line. The detection of lanes is an important part of the vehicle-aided driving system. In view of this feature, this paper proposes the use of improved Hough transform to achieve straight-track detection of lane detection, while for the detection of curved sections, the tracking algorithm is studied. By controlling the slope of the lane lines in the two frames before and after comparison, a limitation is made near the previously detected lane line area, ie, a region of interest (ROI) is set, and a search for a corner pixel is performed in the direction, for the corner portion Rebuild. The experimental results show that the algorithm has the characteristics of fast operation speed, high accuracy and good robustness.

(CE3006) Research of single FBG tactile sensor based on tissue palpation

Qi Jiang, Junjie Wang

School of Control Science and Engineering, Shandong University, Jinan, China

This paper mainly aims at the problem of abnormal tissue identification in minimally invasive surgery. Based on the fiber Bragg grating sensing mechanism, a simple tactile sensor based on sliding is proposed. On the basis of analyzing and summarizing the previous research work, the sensor prototype is designed. And the force conditions of four kinds of microstructures are simulated. The sensor prototype has been made in kind and the fiber grating sensor model is calibrated. An experimental platform was set up and the artificial soft tissue embedded in hard nodules was made. Through the indentation experiment and dot matrix experiment, the feasibility of sliding test is illustrated. When the depth of the sensor indentation is consistent, the sensor slid through the surface of the artificial soft tissue model and collected data through the FBG demodulator and processed the data by MATLAB to form the image to judge the position of the hard objects. Through the sliding experiment, it was proved that the measurement of the spatial distribution of the tissue surface and the location of hard embedded tissue could be realized by the sliding experiment.



(CE3007) Bifurcation sequences of vibro-impact mechanical systems in 1:4 resonance case

Sanshan Du, Yuqing Shi, **Guanwei Luo**

School of Mechanical Engineering, Lanzhou Jiaotong University, Lanzhou, PR China

A forced oscillator with a free rigid body, is considered. Local dynamical behavior of the impact oscillator, under 1:4 strong resonance condition, is studied. Some interesting dynamical features near 1:4 resonance point are found for the impact oscillator, including Neimark-Sacker bifurcation of single-impact periodic motion, tangent and fold bifurcations of period-4 four impact motion, etc. Quasiperiodic impact orbit, associated with period-1 motion, is created through Neimark-Sacker bifurcation, but destroyed as a tangent bifurcation of period-4 four-impact motion occurs.

(CE075) Numerical Prediction for Hydrodynamic Coefficient of Small Open-Frame ROV

Zhen Wang, **Mingxing Lin**, Chenggang Dai, Xiaojian Wu, Zhiguang Guan, Dong Zhang

School of Mechanical Engineering, Shandong University, China

The geometry of small open-frame ROV (Remotely Operated Vehicle) is complex, so it becomes very difficult to identify its hydrodynamic coefficients. In this paper, the cost efficient CFD (Computational Fluid Dynamic) approach is presented to predict the two hydrodynamic critical parameters: the added mass and the damping coefficient. The simulation results are shown to coincide with the conclusions of Morison equations, which indicates the CFD approach can determine hydrodynamic coefficients of small open-frame ROV. This paper has a certain reference value for in-depth study of hydrodynamic performance and control system of small openframe ROV.



Public Transport

From Airport to Lanzhou Jiaotong University

Lanzhou Zhongchuan International Airport

↓ Airport bus Anning line

South side of Jinniu Street

↓ walk about 1km

Lanzhou Jiaotong University

From Airport to Guotai Anning Hotel

Lanzhou Zhongchuan International Airport

↓ Airport bus Anning line

Opposite of Guotai Anning Hotel (Communicate with Drivers)

↓ walk through the overpass

Guotai Anning Hotel

From Lanzhou Jiaotong University to Airport

Lanzhou Jiaotong University

↓ BRT, B1, Liujiabao Direction, 4 stops.

Shiji Dadao Station

↓ walk to east 280m

Kunyi Boutique Hotel

↓ Airport bus Anning line (Consult: 0931-7662666)

Lanzhou Zhongchuan International Airport

From Lanzhou Jiaotong University to Guotai Anning Hotel

Lanzhou Jiaotong University

↓ BRT B1, Liujiabao Direction, 5 Stops

Liujiabao Square Station

↓ Walk about 10-15 mins

Guotai AnNing Hotel

Local Information

Bank and Post offices

Banks are open between 10.00 and 16.00 on weekdays.

Currency

The official currency is Renminbi (CNY). USD 1 = CNY 6.85, EUR 1 = CNY 7.91 (August 2018).

Time Zone

The time zone in Lanzhou is GMT + 8 hour.



Ferry Bus Schedule & Conference Staffs

Ferry Bus Schedule

From	To	24, Aug	25, Aug.			26, Aug.	
			Morning	Noon	Evening	Morning	Noon
Guotai Anning Hotel	Lanzhou Jiaotong University		07:30	13:40		8:30	
Lanzhou Jiaotong University	Guotai Anning Hotel	18:30		12:25	18:15		11:30

Ferry Bus Parking Station



Conference Staffs

Contents	Contact Person	Telephone
General Coordinator	Zonggang Li	15117263527
Onsite Registration	Fan Wu	17323097611
Hotel& Catering & Ferry Bus	Liming Ge	13609322336
Venue Service	Huirong Shi	13679464156
Security	Dewen Wang	13993193161



Conference Site Introduction

Lanzhou Jiaotong University, China



Address: No.88, West Anning Road, Anning District, Lanzhou, Gansu Province, China

Lanzhou Jiaotong University (LZJTU) (formerly Lanzhou Railway University) was established in 1958 through the combination of departments and sections from two highly reputable Chinese railway institutes: Tangshan Railway Institute (the present Southwest Jiaotong University) and Beijing Railway Institute (the present Beijing Jiaotong University).

In April 2003, with the approval of the Ministry of Education, the name of Lanzhou Railway University was changed to Lanzhou Jiaotong University. After 60 years of construction and development, LZJTU ranks as a comprehensive technical institution. The University has graduated more than 50,000 highly trained engineers and managers for both the railways and local transportation concerns. Through the long course of its operation, the University has firmly established its own excellent traditions and achieved a dominant position in many technical fields.

The university now possesses total assets of 1.601 billion yuan, and has a campus that covers an area of 1566 acres. It has 21 schools, two independent departments and two teaching departments, four Changjiang Scholars Program Creative Team, four postdoctoral research centers on transportation engineering, Mechanical Engineering, Civil Engineering and Environmental Science and Engineering. 5 first class disciplines, 34 second class doctoral disciplines, 105 master's degrees, 61 undergraduate programs, 19 provincial-level key disciplines, 53 laboratories and research centers, 15 key provincial and ministerial laboratories, four national experimental teaching demonstration center, and 1 national University Science and Technology District. The university currently employs 2,300 educational professionals. Among the teachers, there are 243 full professors, 497 associate professors, 348 doctoral recipients and 827 master's recipients. The university's current enrollment totals over 30,000 students, including over 22000 full-time undergraduate students, over 4400 postgraduates and Ph.D. candidates, 260 foreign students, and over 12,000 participants in adult education courses.

Furthermore, the Board of Directors of the university, which consists of members from over one hundred government departments and companies, was set up in 2001, signifying the establishment of a new multi-faceted education system.

The University will contribute to the rapid economic growth and social development of Northwestern China, adding to the nation's growth through the development of new teaching methods, excellence in scientific



60th Anniversary of Lanzhou Jiaotong University

research and the aggressive pursuit of product development. The University's goal is to educate talented scientists and engineers to become open-minded and innovative professionals who will be the foundation of China's development as a preeminent scientific and engineering powerhouse.

In the past 60 years, Lanzhou Jiaotong University has made great achievements in teaching, scientific research, management and personnel training. We will continue the fine traditions formed over time, putting emphasis on the university motto “Morality, Ambition, Erudition and Practicality” , and laying a solid foundation in building LZJTU into an even more research-oriented university, first-rate in China and well-known in the world.

Guotai Anning Hotel



Address: No. 922 Binhe West Road, Anning District, Lanzhou, Gansu Province, China

During the conference, there is a ferry bus between this hotel and Lanzhou Jiaotong University. The arrangement is as Ferry Bus Schedule.



Appendix

Listeners

(L001) **Prof. Jinli Guo**, University of Shanghai for Science and Technology, China

(L002) **Prof. Minfen Shen**, Shantou Polytechnic, China

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