

# **2023 International Symposium on Intelligent Robotics and Systems (ISoIRS 2023)**

**Changsha, China  
26-28 May 2023**



**IEEE Catalog Number: CFP23DC9-POD  
ISBN: 979-8-3503-3997-0**

**Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP23DC9-POD
ISBN (Print-On-Demand):	979-8-3503-3997-0
ISBN (Online):	979-8-3503-3996-3

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2023 International Symposium on Intelligent Robotics and Systems (ISoIRS) **ISoIRS 2023**

## Table of Contents

Message from the General Chairs .....	xi
Message from the Program Chairs .....	xii
Organizing Committee .....	xiii
Program Committee .....	xiv
Reviewers .....	xv
Sponsors .....	xvii

### ISoIRS 2023

Evaluation of the Decoration Styles of Commercial Space at Cruises .....	1
<i>Shaoming Lu (Shanghai Jiao Tong University, China) and Yueying Chen (Shanghai Jiao Tong University, China)</i>	
CMSC: Cross-Media Semantic-Graph Feature Matching Algorithm for Autonomous Vehicle Relocalization .....	5
<i>Shuhang Tan (University of Science and Technology of China, China), Hengyu Liu (Dept. of Information and Communication Xiamen University Xiamen, China), and Zhiling Wang (Hefei Institutes of Physical Science, Chinese Academy of Sciences Hefei, China)</i>	
A Modified Brush Tyre Model and LP Tyre Force Allocation for 4WIS/4WID Vehicles Motion Control .....	12
<i>Yunchang Yu (Tsinghua University, China), Wenfei Ji (Tsinghua University, China), Runfeng Li (Tsinghua University, China), and Guangyu Tian (Tsinghua University, China)</i>	
A Data-Driven Estimation Algorithm for Vehicle Side-Slip Angle .....	18
<i>Yonghui Wang (UCSI University, Malaysia) and Syamsunur Deprizon (UCSI University, Malaysia)</i>	
Cooperative Motion Planning for Connected and Automated Vehicle Platoons at Unsignalized Intersections .....	22
<i>Zhongqi Zhang (Beihang University, China), Linjie Gao (Beihang University, China), Jiajin Chen (Beihang University, China), Mingyang Xu (Beihang University, China), Qi Wang (Beihang University, China), and Xuting Duan (Beihang University, China)</i>	
An Optimal Control Based Trajectory Planning Method for Cooperative Merging Maneuvers ...	28
<i>Qi Wang (Beihang University, China), Hao Ge (Nanjing Research Institute of Electronic Engineering, China), Xuting Duan (Beihang University, China), and Jianshan Zhou (Beihang University, China)</i>	

Coverage Capacity Optimization of UAV-Enabled Networks .....	34
<i>Mingxi Yang (Beihang University, China), Jianshan Zhou (Beihang University, China), Daxin Tian (Beihang University, China), Xuting Duan (Beihang University, China), and Dezhong Zhao (University of Glasgow, UK)</i>	
Research on the Optimization Algorithm of Dynamic Obstacle Avoidance Path Planning for Unmanned Vehicles .....	39
<i>Shuting Chen (Chang'an University, China), Kangtai Dong (Chang'an University, China), Ziang Tian (Chang'an University, China), and Wenhan Feng (Chang'an University, China)</i>	
A Compliance Control Strategy for an Upper-Limb Rehabilitation Robot with a Quick and Real-Time Human-Robot Interactive Force Estimation .....	48
<i>Guoning Li (Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Ningbo Cixi Institute of Biomedical Engineering, China), Sijia Ye (Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Ningbo Cixi Institute of Biomedical Engineering, China), Jingyan Meng (Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; Ningbo Cixi Institute of Biomedical Engineering, China), Guokun Zuo (Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Ningbo Cixi Institute of Biomedical Engineering, China), Jiaji Zhang (Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Ningbo Cixi Institute of Biomedical Engineering, China), and Changcheng Shi (Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Ningbo Cixi Institute of Biomedical Engineering, China)</i>	
Predicting the State of Health of Lithium Battery Based on Improved LSTM-RNN .....	52
<i>Jixiang Li (Electronic Information Tianjin University of Science &amp; Technology, China), Bang Jin (Electronic Information Tianjin University of Science &amp; Technology, China), Jingda Chang (Electronic Information Tianjin University of Science &amp; Technology, China), Tao Zhang (Electronic Information Tianjin University of Science &amp; Technology, China), and Zhaoyang Liu (Electronic Information Tianjin University of Science &amp; Technology, China)</i>	
Research and Design of Energy-Saving Vehicle Operation Based on Supercapacitor .....	56
<i>Lihong Zhu (The Engineering &amp; Technical College of Chengdu University of Technology, China), Xiaoyu Wang (The Engineering &amp; Technical College of Chengdu University of Technology, China), Jing Liu (The Engineering &amp; Technical College of Chengdu University of Technology, China), Yupei Zhu (The Engineering &amp; Technical College of Chengdu University of Technology, China), and Shixing Fan (The Engineering &amp; Technical College of Chengdu University of Technology, China)</i>	
Research on Multi-Mode Digital Human Identity Security Protection Technology .....	61
<i>Haizhou Tong (Xiamen University of Technology, China)</i>	
Research on New Media Automatic Question Answering and Learning Robot for Specific Scene ...	66
<i>Huifang Liu (Dongguan City University, China) and Yunfeng Ye (Dongguan City University, China)</i>	

Research on English Chatbot Design for Civil Aviation Service .....	71
<i>Chen Huang (School of rail transit and air service, Tianjin transportation technical college, China)</i>	
Design of Measurement and Control Robots for Dust Monitoring .....	76
<i>Chunhuan Du (Ji'ning Ren Cheng Construction Quality and Safety Service Center, China) and Shujun Gao (Shandong Cheng Xiang Construction Co., Ltd., China)</i>	
Design of Garbage Automatic Sorting and Disposal Robot .....	81
<i>Shujun Gao (Shandong Cheng Xiang Construction Co., Ltd., China) and Chunhuan Du (Ji'ning Ren Cheng Construction Quality and Safety Service Center, China)</i>	
BP-Based Evaluation Paradigm of Automobile Marketing Professional Information Teaching Practise .....	86
<i>Jing Sun (School of Automobile Engineering, Tianjin Transportation Technical College, China)</i>	
An Intelligent Diagnosis Model of Power Grid Transformer Fault Based on BP Neural Networks and Genetic Algorithms .....	91
<i>Guichuan Yuan (State Grid Sichuan Electric Power Company, China), Ying Chen (State Grid Sichuan Electric Power Company, China), Chen Yu (NARI Group Corporation(SGRPRI), China), and Fu Su (State Grid Sichuan Electric Power Company, China)</i>	
Global Path Planning of Substation Intelligent Inspection Robot Based on Improved Dijkstra Algorithm .....	96
<i>Binjie Liao (State Grid Sichuan Electric Power Company, China), Zhihua He (State Grid Sichuan Electric Power Company, China), Chen Yu (NARI Group Corporation(SGRPRI), China), and Jiao You (State Grid Sichuan Electric Power Company, China)</i>	
Research on Power Supply Chain Risk Early Warning System Based on ACO-SVM Algorithm	101
<i>Li Wang (State Grid Zhejiang Producement Company, China) and Xiaozhe Hu (State Grid Zhejiang Producement Company, China)</i>	
Key Technology of Traceable Supply Chain System of Power Material Based on Blockchain ....	106
<i>Xiaozhe Hu (State Grid Zhejiang Producement Company, China) and Li Wang (State Grid Zhejiang Producement Company, China)</i>	
Power Enterprise Supply Chain Risk Evaluation and Design of Early Warning System Based on Semantic Clustering .....	111
<i>Li Wang (Supply Department State Grid Zhejiang Producement Company, China), Xiaozhe Hu (Enterprise Supply Chain Operation Center State Grid Zhejiang Producement Company, China), Minghui Lin (Materials Management Department State Grid Ningbo Electric Supply Company, China), and Heng Yu (Materials Management Department State Grid Ningbo Electric Supply Company, China)</i>	
Research on Elderly Fall Prevention Recognition System for Intelligent Elderly Care and Machine Vision .....	115
<i>Yixiang Niu (Xi'an Jiaotong University City College, China)</i>	
Comparison of Offline Monitoring Algorithms for Production Data of Workshop Equipment Based on DTW .....	120
<i>Tang Jia (Wuxi Automobile Engineering Branch of Jiangsu Union Technical, China) and Su Yi (Wuxi Vocational Institute of Commerce, China)</i>	
Visual 3D Perception Method Based on the Monocular Single-Degree-of-Freedom Rotation .....	127
<i>Xufang Qin (Chang'an University, China), Xiaohua Xia (Chang'an University, China), and Pengju Yue (Chang'an University, China)</i>	

Identification and Measurement of Bridge Cable Surface Damage Based on Point Cloud Segmentation .....	132
<i>Fabo Qiu (Key Laboratory of Road Construction Technology and Equipment of MOE Chang'an University Xi'an, China), Xiaohua Xia (Key Laboratory of Road Construction Technology and Equipment of MOE Chang'an University Xi'an, China), Xufang Qin (Key Laboratory of Road Construction Technology and Equipment of MOE Chang'an University Xi'an, China), Jian Chen (Key Laboratory of Road Construction Technology and Equipment of MOE Chang'an University Xi'an, China), and Yaoyao Wang (Key Laboratory of Road Construction Technology and Equipment of MOE Chang'an University Xi'an, China)</i>	
Mathematical Model Optimization of Parallel Robot Position Parameters Based on 3×3 Quadratic Transformation Matrix Description .....	138
<i>Shuai Li (Guangxi Science &amp; Technology Normal University, China) and Guimei Lv (Guangxi Science &amp; Technology Normal University, China)</i>	
Total-State Optimal Constrained Nonlinear Robust Adaptive Decentralized Excitation Control	141
<i>Xinfei Shang (Shijiazhuang Tiedao University, China), Zhifeng Gu (Tsinghua Taihao Sanbo Electric Motor Co., LTD, China), Xuemin You (Hebei Qianjin Machinery Factory, China), Biao Wang (Shijiazhuang Tiedao University, China), Wenwen Yang (Shijiazhuang Tiedao University, China), and Jianzhong Zhang (Hebei Qianjin Machinery Factory, China)</i>	
New Back-Stepping Adaptive Optimal Excitation Controller Based on STF .....	146
<i>Wenwen Yang (Shijiazhuang Tiedao University, Shijiazhuang), Zhifeng Gu (Tsinghua Taihao Sanbo Electric Motor Co., LTD, Shijiazhuang), Xuebin Jia (Hebei Qianjin Machinery Factoryline, Shijiazhuang), Xinfei Shang (Shijiazhuang Tiedao University, Shijiazhuang), Biao Wang (Shijiazhuang Tiedao University, Shijiazhuang), and Xuemin You (Hebei Qianjin Machinery Factoryline, Shijiazhuang)</i>	
A Single-Point Pose Constraint Based 6R Robot Kinematic Calibration Method Through Monocular Vision .....	152
<i>Yongxing Liu (State Key Lab of Digital Manufacturing Equipment and Technology, Huazhong University of Science and Technology, China), Xiaoqi Tang (State Key Lab of Digital Manufacturing Equipment and Technology, Huazhong University of Science and Technology, China), Bao Song (State Key Lab of Digital Manufacturing Equipment and Technology, Huazhong University of Science and Technology, China), Jinglong Zhong (State Key Lab of Digital Manufacturing Equipment and Technology, Huazhong University of Science and Technology, China), and Xiangdong Zhou (State Key Lab of Digital Manufacturing Equipment and Technology, Huazhong University of Science and Technology, China)</i>	
Self-Tuning Speed Tracking for Autonomous Vehicles Based on Cascaded GRU Predictive Control .....	158
<i>Daifeng Zhang (Qilu University of Technology, China), Chao Zhang (Qilu University of Technology, China), Yong Wang (Qilu University of Technology, China), and Xinhao Lin (Qilu University of Technology, China)</i>	

Equipment Utilization and Maintenance Task Assignment .....	164
<i>Chuanhui Zhang (Northern Information Control Research Institute Group limited corporation, China), Xu Yue (Northern Information Control Research Institute Group limited corporation, China), Hui Qiao (Northern Information Control Research Institute Group limited corporation, China), Chengshai Zhu (Northern Information Control Research Institute Group limited corporation, China), Liwang Li (Northern Information Control Research Institute Group limited corporation, China), and Qianyu Shen (Northern Information Control Research Institute Group limited corporation, China)</i>	
Software Defect Prediction Method Based on RGB Image and Deep Learning .....	169
<i>XueGang Yang (Jiangsu University of Science and Technology, China), Zhen Li (Jiangsu University of Science and Technology, China), Tong Li (Jiangsu University of Science and Technology, China), WenJuan Chu (Jiangsu University of Science and Technology, China), and WeiJia Huang (Jiangsu University of Science and Technology, China)</i>	
Research on Software Test Case Generation Based on SysML .....	173
<i>FeiFei Chen (NCS Testing Technology Co., Ltd., China), YaRu Zhao (Beijing Institute of Space Launch Technology, China), and Zhen Li (Ocean College, Jiangsu University of Science and Technology, China)</i>	
An Efficient Distributed K-SVD Algorithm for Image Reconstruction .....	178
<i>Wenqing Gao (Shanghai University, China), Jingjing Liu (Shanghai University, China), and Luqiao Yin (Shanghai University, China)</i>	
Infrared Dim Small Target Detection of Ship on the Sea Based on Improved RPCA .....	183
<i>Tao Liu (State Grid Shanghai Changxing Power Supply Company, China), Congwei Tang (State Grid Shanghai Changxing Power Supply Company, China), Qiushi Zhang (State Grid Shanghai Changxing Power Supply Company, China), Runping He (Ningbo Dehong Enterprise Development Co., Ltd, China), and Yucong Chen (State Grid Shanghai Changxing Power Supply Company, China)</i>	
A New Method for Patch .....	188
<i>Ruimin Gao (UESTC, China)</i>	
Research On Flight Test of Civil Aircraft Cargo Compartment Smoke Detection .....	191
<i>Zheng Li (COMAC Flight Test Center, Shanghai Engineering Research Center of Civil Aircraft Flight Testing, China) and Jiazuo Yu (COMAC Flight Test Center, Shanghai Engineering Research Center of Civil Aircraft Flight Testing, China)</i>	
SWIN-Fovea: A Remote Sensing Object Detection Model Based on Swin Transformer and FoveaBox.....	196
<i>Yunxiao Lin (Sun Yat-sen University, China), Jianguo Hu (Sun Yat-sen University, China), Yanyu Ding (Dongguan University of Technology, China), Miaowang Zeng (Dongguan University of Technology, China), and Chanzi Liu (Dongguan University of Technology, China)</i>	
Incremental Approach for Early Time Series Classification .....	200
<i>Lin Miao (Beijing Information Science &amp; Technology University, China), Gan Luo (Beijing Information Science &amp; Technology University, China), and Xiulei Liu (Beijing Information Science &amp; Technology University, China)</i>	

Research on Entity Alignment Method in Civil Aviation Equipment Domain Based on Translation Embedding .....	204
<i>Dongdong Guo (Beijing Information Science and Technology University, China), Jingbo Wang (Beijing Information Science and Technology University, China), and Anna Fu (Beijing Information Science and Technology University, China)</i>	
Research on Alignment Method of Civil Aviation Equipment Domain and General Knowledge Graph Entity Based on Graph Neural Network Embedding .....	215
<i>Dongdong Guo (Beijing Information Science and Technology University, China), Tianyu Wu (Beijing Information Science and Technology University, China), and Anna Fu (Beijing Information Science and Technology University, China)</i>	
<b>Author Index .....</b>	<b>225</b>