# 2023 6th International Conference on Intelligent Autonomous Systems (ICoIAS 2023)

Qinhuangdao, China 22-24 September 2023



IEEE Catalog Number: ISBN: CFP23O41-POD 979-8-3503-7126-0

## 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.

CFP23O41-POD
979-8-3503-7126-0
979-8-3503-7125-3
2836-7634

#### 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 Web: www.proceedings.com



## 2023 6th International Conference on Intelligent Autonomous Systems (ICoIAS) ICOIAS 2023

#### **Table of Contents**

Preface	. xiv
Organizing Committee	
Reviewers	xviii

#### Visual based image analysis and application

A Human-Computer Interaction Method for Intelligent Pan-Tilt Based on the Combination of Head-Eye Posture
<ul> <li>A Flame Localization Method Combing Visible-Light and Near-Infrared Cameras</li></ul>
<ul> <li>Semantic Line Map: A Novel Visual Map Representation Scheme for Autonomous Driving Systems 15</li> <li>Dezhi Zhu (Huazhong University of Science and Technology, China),</li> <li>Dingxin He (Huazhong University of Science and Technology, China),</li> <li>Yaohai Zhou (University of California Los Angeles, USA), and Zhiwei</li> <li>Liu (Huazhong University of Science and Technology, China)</li> </ul>
<ul> <li>Visual SLAM Algorithm Based on Deep Learning Feature Extraction and Mismatch Elimination 21 Zehui Wu (Dalian Maritime University, China), Yunsheng Fan (Dalian Maritime University, China), and Guofeng Wang (Dalian Maritime University, China)</li> </ul>
Coal-Rock Interface Image Segmentation based on U2Net Model with Coordinate Attention

A Robustness Enhanced Capsule Network with Regularization	5
Ru Zeng (University of Shanghai for Science and Technology, China),	
Yan Song (University of Shanghai for Science and Technology, China),	
Min Li (Shanghai Institute of Microsystem and Information Technology,	
China), Yuzhang Qin (University of Shanghai for Science and	
Technology, China), and Tingxuan Ni (University of Shanghai for	
Science and Technology, China)	

## Image based intelligent detection and recognition technology

Insulator and Spacer Dataset and Benchmark for Power Inspection	1
Research on Collision Avoidance of Unmanned Surface Vehicle Based on Improved DDPG	17
Object Detection for Intelligent Driving Based on Improved YOLOv5	;3
An Improved Real-Time Detection Method for Flame and Smoke Identification Based on YOLOv5 . 5 Liancheng Su (Yanshan University, China), Shichao Zhang (Yanshan University, China), and Weili Ding (Yanshan University, China)	;9
Research on the Hardness Identification Method of Rock Wall for Shearer Based on SSA-VMD-SSAE	55
Unsupervised Anomaly Detection of Unmanned Aerial Vehicles based on Spatial-Temporal Model with Flight Data	70
<ul> <li>A Coal-Rock Cutting Hardness Recognition Model based on CNN-PN</li></ul>	'6

Smoke and Fire Detection Algorithm based on Improved YOLOv5 Yutong Wang (Dalian Maritime University, China) and Ying Hu (Dalian Maritime University, China)	82
Research on Improving ST-GCN for Recognition of Unsafe Actions of Personnel in Industrial Site	88
Ning Qin (Dalian Maritime University, China), Ying Hu (Dalian Maritime University, China), and Haowei Shi (Dalian Maritime University, China)	
Research on Industrial Human Action Recognition based on Improved SlowFast Zhen Liang (Dalian Maritime University, China), Ying Hu (Dalian Maritime University, China), and Ransheng Yang (Dalian Maritime University, China)	94

#### Data Calculation and Location Technology in Intelligent Communication Systems

Traffic Flow Prediction Based on Spatial-Temporal Sparse Attention Networks	0
Research on Algorithm for Guidance Information Extraction of Rotational Bias Passive Radar       10         Si Lin Hou (Xi'an Aerospace Precision Mechatronics Institute, China),       10         Jie Gu (Southwest China Research Institute of Electronic Equipment,       10         China), Jing Fei Jiang (Southwest China Research Institute of       10         Electronic Equipment, China), Yan Ting Che (Southwest China Research       10         Institute of Electronic Equipment, China), Yan Ting Che (Southwest China Research       10         Polytechnical University, China)       10	6
High-Precision Indoor Positioning for Drone based on EfficientNetV2 and CNN	2
Research on Space-Ground Collaborative Fault Diagnosis Technology in Satellite Based on LSTM	8
<ul> <li>Co-Design of Underwater Detection and Communication-Part I: Detection-Based Shared</li> <li>Waveform</li></ul>	3

Co-Design of Underwater Detection and Communication-Part II: Communication-Based Shared	
Waveform	. 129
Haiyu Wang (Yanshan University, China), Xiaoyuan Luo (Yanshan	
University, China), Fubo Chen (Yanshan University, China), and Jing	
Yan (Yanshan University, China)	

#### AI Based Information Management and Data Analysis

Intelligent Ship Navigation Method Based on Deep Reinforcement Learning Algorithm 135 Youyu Chai (Dalian Maritime University, China), Wei Guan (Dalian Maritime University, China), Husheng Han (Dalian Maritime University, China), and Zhewen Cui (Dalian Maritime University, China)
A Method for Constructing Semantic Navigation Maps in Urban Environments
<ul> <li>Detection of Alzheimer's Disease using Deep Learning: An Optimized Approach</li></ul>
Learning Dynamic Graph Structures for Sea State Estimation with Deep Neural Networks
<ul> <li>BERT and Word Segmentation Algorithm Research on the Relationship between Diabetes</li> <li>Symptoms and Traditional Chinese Medicine</li></ul>

#### **Robot Path Planning and Collaborative Control**

<ul> <li>A Solution To The Problem Of Self-Interference Under Multi-Robot Cooperative Exploration</li> <li>With 2D Lidar</li></ul>
Dynamic Event-Triggered Robust Adaptive Practical Fixed-Time Trajectory Tracking Control         for Underactuated AUVs       192         Junnan Liu (Dalian Maritime University, China) and Jialu Du (Dalian         Maritime University, China)
Path Following Control of Unmanned Surface Vehicle Based on Improved Line-of-Sight Method 198 Zhengkun Shi (China Ship Research and Development Academy, China), Chong Wang (China Ship Research and Development Academy, China), Hanxizi Zhang (China Ship Research and Development Academy, China), Zining Shangguan (China Ship Research and Development Academy, China), Haishen Ni (China Ship Research and Development Academy, China), Jiayi Liu (China Ship Research and Development Academy, China)
<ul> <li>Research on Path Planning Control of Maze Robot</li></ul>
Dynamic Multi-Robot Path Planning in Narrow-Lane Environments with One-Way Constraint210 Zhenyu Song (Zhejiang University, China), Ronghao Zheng (Zhejiang University, China), Senlin Zhang (Zhejiang University, China), and Meiqin Liu (Zhejiang University, China)
Path Planning of Autonomous Underwater Vehicle Departing from Port Based on Improved Deep Q-Network
Path Following Control of Underactuated AUV Based on Improved Model Predictive Control 222 Siqi Wang (Dalian Maritime University, China), Meng Joo Er (Dalian Maritime University, China), Tianhe Liu (Dalian Maritime University, China), and Huibin Gong (Dalian Maritime University, China)
Global Motion Planning for Unmanned Aerial Vehicle Automation

## Design and Optimal Control of Multi Agent Systems

A New Distributed Sliding Mode Controller Design for Multi-Agent Systems	234
Bipartite Consensus Control for Fixed and Switching Multi-Agent Systems via State Feedback, Observer and Output Feedback	239
Yao Yao (Taiyuan University of Science and Technology, China), Jie Zhang (Taiyuan University of Science and Technology, China), and Jian-An Wang (Taiyuan University of Science and Technology, China)	-09
<ul> <li>Finite-Time Prescribed Performance Synchronization for Complex Dynamical Networks based on</li> <li>Event-Triggered Pinning Control</li></ul>	245
<ul> <li>Anti-Wind and Wave Interference Control of Sea Gangway based on DDPG Algorithm</li></ul>	251
Target-Fencing Control of Multi-Agent Systems with Input Saturation       2         Jiale Tan (Nanjing University of Science and Technology, China), Cheng       2         Song (Nanjing University of Science and Technology, China), and       3         Jiazheng Zhang (Nanjing University of Science and Technology, China), China)       3	256
Distributed Enclosing Control of Second-Order Multi-Agent Systems with An Unknown Dynamic	061
Target       2         Wenting Chen (Beijing University of Chemical Technology, China), Liya       2         Dou (Beijing University of Chemical Technology, China), and Dazi Li       3         (Beijing University of Chemical Technology, China)       3	-01

### Modern Control Theory and Application Technology

Bidirectional Switched Gain Adaptive LMI Sliding Mode Control for VSP Propulsion Ship Dynamic Positioning	267
Distributed Fixed-Time Control of Inverter Air Conditioners Based on Consensus Strategy	273
Chupeng Xiao (Nari Group Corporation/State Grid Electric Power	
Research Institute), Jing Xu (Nari Group Corporation/State Grid	
Electric Power Research Institute), Chenguan Xu (State Grid Electric	
Power Research Institute Wuhan Effciency Evaluation Company Limited),	
Liangliang Zhu (Nari Group Corporation/State Grid Electric Power	
Research Institute), Junping Gui (Nari Group Corporation/State Grid	
Electric Power Research Institute), and Xi Wang (State Grid Electric	
Power Research Institute Wuhan Effciency Evaluation Company Limited)	

Resilient Consensus Control of Nonlinear Second-Order MASs under DoS Attacks Siran Wang (Yanshan University, China), Xiaolei Li (Yanshan University, China), Yuliang Fu (Yanshan University, China), Jiange Wang (Yanshan University, China), and Xiaoyuan Luo (Yanshan University, China)	279
Research on the Integrated Guidance and Control with Sigular Perturbation Theory Jie Gu (Southwest China Research Institute of Electronic Equipment, China), Weiyang Jia (Northwestern Polytechnical University, China), Jingfei Jiang (Southwest China Research Institute of Electronic Equipment, China), and Yanting Che (Southwest China Research Institute of Electronic Equipment, China)	285
An Approach to Finite-Time H∞ Control of T-S Fuzzy Systems via Piecewise Lyapunov	201
Functions Yue Li (Northwestern Polytechnical University, China), Meng Wang (East China University of Science and Technology, China), and Jie Gu (National Key Laboratory of Electromagnetic Space Security, China)	291
Adaptive Control of Virtual Synchronous Generator Based RBF Neural Network Xiaoyuan Luo (Yanshan University, China), Litao Zhu (Yanshan University, China), Shaoping Chang (Yanshan University, China), Xinyu Wang (Yanshan University, China), and Guoyou Li (Yanshan University, China)	. 297
Fuzzy Impulsive Control of Multi-Line Re-Entrant Manufacturing Systems	. 303
An Improved Grey Wolf Optimization Algorithm for Parameter Tuning of Active Disturbance Rejection Control Hongyu Wang (Anhui University, China), Tianhong Pan (Anhui University, China), and Yuan Fan (Anhui University, China)	. 309
Q-Learning Control for Robust H∞ Tracking of De-Oiling Hydrocyclone Systems Yuguang Zhang (Yanshan University, China), Shaobao Li (Yanshan University, China), and Xiaoyuan Luo (Yanshan University, China)	314
Robust H∞ Output Regulation of Nonlinear Systems Shaobao Li (Yanshan University, China), Yuxiang Wang (Yanshan University, China), and Xiaoyuan Luo (Yanshan University, China)	320

### Control Model and State Monitoring in Intelligent Power Systems

Distributed Predefined-Time Economic Dispatching for Microgrids Shaoping Chang (Yanshan University, China), Hao Wang (Yanshan University, China), and Xiaoyuan Luo (Yanshan University, China)	. 326
Research on Modeling Method of Centralized Heating System based on Hybrid Drive	332
Weida Liu (Dalian Maritime University, China), Siyuan Liu (Dalian	
Thermal POWER CO., LTD., China), Yunsheng Fan (Dalian Maritime	
University, China), and Dianzong Yang (Dalian Maritime University,	
China)	

Analysis of Maximum Permissible Delay-Time Limit for Stability of PV-Battery Grid-Tied
System       338         Jiarong Xu (Yanshan University, China), Jiaxun Teng (Yanshan       338         University, China), Xinlei Liu (Yanshan University, China), Wei Zhao       (Yanshan University, China), Xin Li (Yanshan University, China), and
Xiaofeng Sun (Yanshan University, China)
<ul> <li>Fault Diagnosis Method of Bearings under Variable Operating Condition based on HFL-TL</li></ul>
Optimal Scheduling of the New Energy Hybrid Ship System via Improved Grey Wolf         Optimization Algorithm       350         Xiaoyuan Luo (Yanshan University, China), Jiaxuan Wang (Yanshan       350         University, China), Lei Xu (Yanshan University, China), and Xinyu Wang       (Yanshan University, China)
Research on Long and Short Term Heat Load Prediction of Central Heating
A Low-Voltage Apparatus Assembly Quality Inspection Network Based on ConvNeXt
Optimal Path Planning Method for Emergency Repair based on Heating GIS System
An Imitation Learning and Reinforcement Learning Approach to Power System Stabilizer
Optimization Method for Demand Response of Thermal Storage Electric Boilers

Author Index	
--------------	--