

2024 8th International Conference on Robotics, Control and Automation (ICRCA 2024)

**Shanghai, China
12-14 January 2024**



**IEEE Catalog Number: CFP24BU7-POD
ISBN: 979-8-3503-4473-8**

**Copyright © 2024 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:	CFP24BU7-POD
ISBN (Print-On-Demand):	979-8-3503-4473-8
ISBN (Online):	979-8-3503-4472-1

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

2024 8th International Conference on Robotics, Control and Automation (ICRCA)

Table of Contents

Preface.....	x
Committee	xi

1. Robot Kinematic Simulation and Functional Analysis

Design and Analysis of Zero Backlash Structure for Gear Driven Robot Joint.....	1
<i>Yupeng Li, Jie Yang, Bing Teng, Guohua Cui, Zhijiang Chen</i>	
A Framework for Automatic Following based on Visual Tracking for Quadruped Robots	6
<i>Guorong Chen, Qihan Fan, Xiaonan Hou</i>	
Kinematic Modeling and Prototype Experiment of Flexible Supernumerary Robotic Finger.....	13
<i>Sun Weijun, Xu Yong, Guo Shuyan, Liu Lingxiao</i>	
Kinematic Modelling and Simulation of Six-DOF Collaborative Robot.....	18
<i>Zhilong Luo, Shuimiao Du, Wanyu Liu</i>	
MLS: A Meta-Learning Based Stackelberg Model for Robot Trajectory Guidance	23
<i>Jin Guo, Zhiyong Jiang, Yifan Liu, Lili Gong</i>	
Loading and Unloading Robot Inverse Kinematics Solution Optimization Algorithm	29
<i>Yunfei Liu, Chunlai He, Weijun Wang, Wei Sun, Shujian Liu, Jiyong Fan, Huarui Liu</i>	
Kinematics of Adjusting Parallel Mechanism for Component Assembly	35
<i>Xinqi Tao, Miao Yuan, Yang Qi, Dong Liang</i>	
Fuzzy Adaptive Second Order Terminal Sliding Mode Trajectory Tracking Control for Robotic Manipulator.....	40
<i>Anding Xu, Song Zhao, Huishen Zhu, Xunwei Wu, Yuanbo Chen, Zheng Hu</i>	
Motion Simulation Control System of Detecting Robot Based on Digital Twin.....	47
<i>Tengfei Li, Xiaochen Huang, Ruiyao Ou, Jingjing Zhang, Yang Xu, GuangDa Lu, Zhanpeng Zhang, Miao Yuan</i>	
Inverse Kinematics Algorithm for 7-DOF Manipulator with Offset and Its Application	53
<i>XiaoFeng Yan, ZhiYong Jiang, JiangTao Hu, ChunLei Wang, Feng Yang</i>	
Kinematics and Performance Analysis of 5-DOF Space Serial Manipulator.....	58
<i>Jinhan Yang, Yang Qi, Yuanhang Lou, Xinyu Jia</i>	
2. Robot Motion Control and Path Planning	
Mobile Robot Path Planning Based on Improved Elite Ant Colony Algorithm	63
<i>Kaiying Yu, Bin Xu</i>	

Motion Error Analysis of High-speed Parallel Robots.....	68
<i>Liangliang Zhu, Sergey S. Gavriushin, Jingzhong Zheng, Guannan Chi</i>	
Trajectory Optimization Algorithm Based on Time-Optimal Cooperative Six-Axis Robot.....	73
<i>Chunlai He, Yunfei Liu, Jinglong Liu, Weijun Wang, Wei Sun, Shujian Liu, Shuo Cheng</i>	
Path Planning for Amphibious Robots with Energy Constrained	79
<i>Qijun Li, Xinde Li, Huitong Zhang, Qiurong Sun, Zhuoran Zhu, Yuxin Liu, Chenyang Zhao, Heqing Li</i>	
A Review of Global and Local Path Planning Algorithms for Mobile Robots.....	84
<i>Qiang Yu, Jun Zhou</i>	
SamSLAM: A Visual SLAM Based on Segment Anything Model for Dynamic Environment	91
<i>Xianhao Chen, Tengyue Wang, Haonan Mai, Liangjing Yang</i>	
Virtual Motoneuron Learning Network for Trajectory Generation of Legged Robot	98
<i>Pengfei Yan, Yaguang Zhu, Qianru Yang, Chunchao Liu</i>	
Robot Ground Laser Point Clouds Segmentation Algorithm Based on Adaptive Slope Thre	103
<i>Liuzhao Li, Xiaonan Hou, Jinxin Xu, Qihan Fan</i>	
Exploration of Multiple-Terrain Field Out of Human Sight by Rat Robot with Multi-sensor Backpack	109
<i>Haobo Xie, Haoze Xu, Kedi Xu, Wei Yang, Canjun Yang</i>	
Adaptive Locomotion Controller for a Quadruped Robot on a High-slope Terrain.....	114
<i>Boer Yin, Jihao Liu, Enguang Guan, Lin Zhang, Yanzheng Zhao, Weixin Yan</i>	
3. Design and Structural Control of Intelligent Robots	
Research on Indoor Mobile Robot Localization Method Based on Improved MCL.....	120
<i>Yuqi Zhou, Huishen Zhu, Xunwei Wu, Yuanbo Chen</i>	
Self-reconfiguration Strategy of Modular Robot Based on Topological Graph Comparison Algorithm	126
<i>Zhengyu Liang, Gang Chen, Junting Fei</i>	
Design and Analysis of an Flapping Wing Robot.....	131
<i>Wei Sun, Shujian Liu, Yunfei Liu, Weijun Wang, Feng Shi, Jiawen Yang</i>	
Visual Data Restoration for Pipeline Inspection Robots by Compressed Sensing	136
<i>Johnatan D. Zamora, Chaoqing Tang</i>	
Key Components and Future Development Analysis of Humanoid Robots	140
<i>Song Zhao, Zhiyong Jiang, Yunji Li, Jinxin Xu, Chunlei Wang</i>	
Efficiency Analysis of Cooperative Robot Based on Dynamic Parameter Identification	148
<i>Tian Xie, Yunfei Liu, Jinglong Liu, Chunlai He, Wei Sun, Shujian Liu, Shuo Cheng</i>	
Development of SimuLink-based Physical Experiment Platform for EtherCAT Bipedal Robots.....	154
<i>Feng Yang, Hao Huang, Jinxin Xu, Hongrun Lu, Yizhuang Sun, Huibin Li, Xiaofeng Yang</i>	

Restricted Spatial Perception-based Robotic Unloading System using Dynamic Grasping Strategy.....	161
<i>Zhaoguang Wang, Jinlong Wu, Jiabin Sun, Luning Zhu, Shuo Cheng</i>	
Disturbance-observer-based Control of the Underwater Vehicle for Manipulation.....	168
<i>Yiqun Wang, Qiyan Tian, Yiping Li, Shuo Li, Hailin Wang, Zhibin Jiang</i>	
Principle and Analysis of Variable Stiffness Joints	173
<i>Wei Sun, Shujian Liu, Yunfei Liu, Weijun Wang, Yangzhou Zhao</i>	
Mechanical Structure and Control System Design of Wall-Climbing and Obstacle-Crossing Robot with Magnetic Adsorption.....	181
<i>Zhanpeng Zhang, Xiaochen Huang, Miao Yuan, Tengfei Li, Ruiyao Ou, Jingjing Zhang, Manhong Li, Xiaojun Zhang</i>	
Study on a Novel Snake Arm Robot for Working in a Narrow Space	186
<i>Wei Sun, Shujian Liu, Yunfei Liu, Weijun Wang, Yangzhou Zhao</i>	
4. AI Based Intelligent Control System and Trajectory Planning	
Faster Trajectory Planning for Lane Change Scenarios with Dynamic Environment.....	192
<i>Jianyu Huang, Yutaka Arakawa</i>	
Trajectory State Model-based Reinforcement Learning for Truck-trailer Reverse Driving	197
<i>Hao Yan, Mohamed A. Zohdy, Edrees Alhawsawi, Amr Mahmoud</i>	
Improved A* Algorithm for Autonomous Vehicle Path Planning under Post-disaster Rescue Scene	206
<i>Zeyu Dong, Hanxu Sun, Gang Chen, Nan Ma, Qingdong Wang, Yuhang Yan</i>	
Research on B-Spline Curve Trajectory Planning Method Considering Curvature	211
<i>Yingkai Sun, Hong Wang</i>	
3D Trajectory Reconstruction under Smooth Camera Motion.....	217
<i>Yongwei Li</i>	
Active Disturbance Rejection Control of Fast Steering Mirror Based on Sparrow Search Algorithm	224
<i>Zhibin Li, Tao Zhang, Chongshang Sun, Jianan Pan</i>	
5. System Measurement and Image Analysis Based on Machine Vision	
Research on Methods of Vehicle Image Retrieval in Expressway Scenarios based on Deep Learning Neural Network.....	230
<i>Ke Yang, Ziyi Zhang, Chihang Zhao, Hao Li, Xinyi Ma, Xuan Li, Wenhao Deng, Yanxin Huang</i>	
Efficient and High-quality Neural Implicit RGB-D Surface Reconstruction with Volume Feature Rendering	235
<i>Jintao Wan, Yu Zhang</i>	
A Computer Vision System for Defect Contrast Enhancement on Transparent Materials with Structured Light and Neural Network	243
<i>An Liu, Chaoqing Tang, Haichao Qi</i>	

A Multi-feature Migration Fog Generation Model.....	248
<i>Xin Ai, Jia Zhang, Yongqiang Bai, Hongxing Song</i>	
Genetic Algorithm-Based Image Segmentation Strategy for Laser Rapid Processing of Bitmap Scanning	253
<i>Tian Zhang, Youmin Rong, Yu Huang</i>	
6. Control Model and Simulation in Power Systems	
Nonlinear Model Predictive Control for Autonomous Flight Using Aircraft Flight Control Surfaces	258
<i>Hironori Masaoka, Tomoaki Hashimoto</i>	
Simulation Research on Active Power Filter Application Based on Auto Disturbance Rejection Control.....	263
<i>Yang Liu, Hejin Xiong, Yancheng Zou, Gaofei Hu</i>	
Nonlinear Model Predictive Control for Torsional Damper Vibration of Automobile Clutch	268
<i>Yong Liu, Tomoaki Hashimoto</i>	
Flyback Converter Modeling and Overload Control Characteristics for Power Supply Based on State-Space Averaging.....	273
<i>Lei Bai, Jin-Yong Bae</i>	
Agile Flight Control Using Incremental Nonlinear Dynamic Inversion with Highly Realistic Model of Actuator	278
<i>Zeliang Wu, Jianchuan Ye, Tao Song</i>	
Embedded Positioner with the Ability to Reduce the Variability Generated by Friction in Control Valves.....	290
<i>Cassio Berni, Claudio Garcia</i>	
Stability Control of Load Voltage Loop of Boost Circuit for Wireless Charging of Electric Vehicle Based on Active Disturbance Rejection.....	298
<i>Yancheng Zou, Hejin Xiong, Yang Liu, Weixing Li</i>	
Research on Low Energy Consumption AC System Control Strategy of Battery Electric Vehicles	305
<i>Dong Ting, Wu Shuxia, Li Wenbo, Wang Wei, Qu Fufan, Shi Cunyang</i>	
Robust Control for Autonomous Vehicle Lateral Dynamics: A Comparative Study of Gain-Schedule LPV and Non-linear MPC*	311
<i>Ahmad Abubakar, Mohammed B. Mohiuddin, Oussama Abdul Hay, Mubarak Yakubu, Ruqqayya Ahmed Alhammadi</i>	
Model-Compensated Active Disturbance Rejection Control for PMSM Based on Parameters Identification	318
<i>Hong Liu, Dewen Tian, Yaqing Wang, Huayuan Liu, Sifang Zhao, Ziyu Wu</i>	
Dynamic Performance of High-altitude Balloons during Ascent and Descent.....	325
<i>Li Chen, Jie Lin, Zhe Song</i>	
7. Modern Control Systems and Engineering	
Analysis and Prediction of Fatigue Life for Suspension	330
<i>Zi Wang, Xintian Liu</i>	

Hysteresis Characteristics of Pneumatic Artificial Muscle.....	334
<i>Cui Tingqiong, Liang Shuang, Luo TianHong, Huang YaTing, Fu Qiang, Ma XiangYu, Huang Yi, Wu Xiao Kai</i>	
Optimization Design of Braking System for A-Double.....	338
<i>Su Xiao, Wang Xiaolan, Liu Jialin, Zhang Hao, Li Yue</i>	
Intelligent PID Controller Based on Deep Reinforcement Learning.....	343
<i>Yinhe Zhai, Qiang Zhao, Yinghua Han, Jinkuan Wang, Wenyi Zeng</i>	
Based on Distributed Detection: Automatic Docking and System Simulation of Compartments	349
<i>Xu Panping, Zhang Liqiang, Liu Gang, Zhang Yilian</i>	
Equipment Failure Prediction Based on the Gray Markov Model.....	360
<i>Qifan Yin, Youbing Chu, Qinglian Zhang, Zhipeng Liu, Sheng Cheng, Zhongliang Jing</i>	
Analysis of Desilting Efficiency of Spiral Dredging Auger Based on EDEM	366
<i>Li Ti-Jin, Wu Ming-Hui, Feng Ye-ning, Zhou Wei</i>	
8. Application of Image Recognition and Detection in Engineering	
Transformer Based Spacial-Temporal Extraction Model for Video Anomaly Detection	370
<i>Zhiqiang Wang, Xiaojing Gu, Xingsheng Gu</i>	
Embedded Marine Target Detection and Positioning Shipboard Terminal Based on Beidou Navigation Satellite System	375
<i>Mingyong Yuan, Min Wang, Zhenjia Chen, Xiao Zhao</i>	
A Simple Confidence-Supervised Model for High-Resolution Defect Recognition	380
<i>Hui-Yue Yang, Hui Chen, Fan Zhang, Xiang Tian, Luning Zhu, Guiguang Ding</i>	
Research and Application of Tablet Backplane Detection Algorithm Based on Machine Vision	385
<i>Xin Huang, Yuqiang Wang, Yuezhong Li, Xianen Zhou</i>	
Research on Methods of Pavement Distress Detection Based on Object Detection Convolutional Neural Network	390
<i>Xingang Wang, Yaxin Huang, Yongjun Shao, Chihang Zhao, Youfeng Zheng, Xinyi Ma, Wenhao Deng, Ziyi Zhang</i>	
Research on Borehole Identification under Tunnel Blasting Based on Yolov5	395
<i>Aolun Guo, Han Li, Zhijiang Zuo, Qingxin Zhang</i>	
Real-Time Deep Learning Based Safe Autonomous Navigation	400
<i>Tuhin Dutta, D. Santhosh Reddy, P. Rajalakshmi</i>	
Attitude recognition of grasped objects by pneumatic three-jaw manipulator with flexible electronic skin.....	407
<i>Yuhao Zhao, Nengmin Liang, Chao Shang, Zhengchun Peng</i>	
Comparison of Algorithm and Kernel Accuracy in Defect Detection Using Pressure in Sleeve Soldering Equipment	412
<i>Kan Watanabe, Hidetake Uwano, Hiroshi Fukuoka</i>	

Target Detection Method Based on Joint Matching of Edge and Region Features	418
<i>He Liang, Xia Liu, AoTian Shen</i>	
A Space Information-Enhanced Dense Video Caption for Indoor Human Action Recognition	423
<i>Bin Chen, Yugo Nakamura, Shogo Fukushima, Yutaka Arakawa</i>	
UAV-Assisted Logo Inspection: Deep Learning Techniques for Real-Time Detection and Classification of Distorted Logos	428
<i>Mohammed Mohiuddin, Oussama Abdul Hay, Ahmad Abubakar, Mubarak Yakubu, Naoufel Werghi</i>	
Method of Eliminating Reflection Interference for Image Recognition in Autonomous Driving.....	433
<i>Qu Bo, Feng Yan, Pan Ruizhi, Zhao Fengzhi, Wang Xurui, Yan Xiyan</i>	
9. Intelligent Optimization Algorithms and Computation	
Equilibrium Stability Analysis in Neural Networks	438
<i>Xuecheng Zhao, Fei Wang, Zhiqiang Huang, Feng Lin</i>	
Many-objective Optimization of Distributed Heterogeneous Hybrid Flowshop Lot-streaming Scheduling Problem with Missing Operations.....	443
<i>Sanyan Chen, Xuewu Wang, Ye Wang, Xingsheng Gu</i>	
A Biogeography-based Optimization Algorithm with Heuristics for Distributed Multiproduct Scheduling Problem.....	448
<i>Yaya Zhang, Xingsheng Gu</i>	
Active Learning Method Based on Pseudo-labeling.....	453
<i>Xiaonan Hou, Chunlei Wang</i>	
Artificial Potential Field-Enhanced Deep Reinforcement Learning for Motion Planning.....	459
<i>Tengyue Wang, Xianhao Chen, Chen Lei, Liangjing Yang</i>	
10. Communication System and Signal Analysis	
Real-time Communication Module Design of LinuxCNC Based on SOEM Master Protocol	466
<i>Xiangqi Peng, Yan Li, Shaojun Liu, Daoping Huang</i>	
Communication Relay Tasks Planning Algorithm for Multiple Unmanned Aerial Vehicles.....	471
<i>Ruowei Zhang, Lihua Dou, Bin Xin</i>	
A Hybrid Method for INS/GPS Integrated Navigation System Based on the Improved Karman Filter and Back Propagation Neural Network.....	477
<i>Mutian Hu, Tao Song, Jianchuan Ye</i>	
Research on Distributed Control-Based Multi-UAV Cooperative Target Coverage Method.....	485
<i>Zhonglaing Tao, Yihui Zhou</i>	

Research and Development of Intelligent Warehouse Management System Based on RFID Technology.....490

Yang Xu, Xiaochen Huang, Jingjing Zhang, Tengfei Li, Ruiyao Ou, Guangda Lu

Author Index