

# **2024 10th International Conference on Electrical Engineering, Control and Robotics (EECR 2024)**

**Guangzhou, China  
29-31 March 2024**



**IEEE Catalog Number: CFP24CT4-POD  
ISBN: 979-8-3503-7001-0**

**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:	CFP24CT4-POD
ISBN (Print-On-Demand):	979-8-3503-7001-0
ISBN (Online):	979-8-3503-7000-3

**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

# 2024 10th International Conference on Electrical Engineering, Control and Robotics (EECR 2024)

## Table of Contents

<b>Preface</b> .....	viii
<b>Committees</b> .....	ix
<hr/>	
<b>❖ Interactive Robot Systems and Control</b>	
Robotic Flexible Collision Detection Based on Second-Order Sliding-Mode Momentum Observer .....	1
<i>Shouyan Chen, Hang Xiao, Liming Qiu, Qilin Bi, Xiaoqun Chen</i>	
ATOM: Leveraging Large Language Models for Adaptive Task Object Motion Strategies in Object Rearrangement for Service Robotics .....	8
<i>Isabel Y. N. Guan, Gary Zhang, Xin Liu, Estella Zhao, Jing Wu</i>	
Identification for Industrial Robots Using Bedplate Force Sensors with Physics-based Simulation Models .....	14
<i>Zhikai Shen, Yan Lu, Hongbo Hu, Chungang Zhuang</i>	
Human-robot Physical Interaction System for Quadruped Guide Robot Based on IMU Data .....	19
<i>Ziqiang Liu, Yiting Zhao, Qine Zhou, Si Wang, Muye Pang, Jing Luo</i>	
Design of STM32-Based Children’s Morning Detection Robot .....	25
<i>Zixuan Huang, Li Wang, Weiwen Pan</i>	
Robot-Elevator Interaction Through IoT Devices for Autonomous Robot Multi-floor Transition .....	30
<i>Zhi Song, Runjia Tan, Shanhe Lou, Chen Lv</i>	
Research and Implementation of Pointer Instrument Reading Recognition Method for Power Plant Inspection Robot .....	35
<i>Rui Yuan, Bo Ji, Rui Meng, Shouhui Liu</i>	
A New Mechanism Designed for Ophthalmic Microsurgery and a Method for Identifying the Home-Length of 6-SPS Stewart Platform .....	41
<i>Yinjie Shao, Weixin Yan, Bing Xie, Yanzheng Zhao, Jihao Liu, Bin Meng, Xue Liu, Haitao Song</i>	
Jumping Performance Optimization of Bipedal Wheeled Robots .....	50
<i>Jiaqi Wang, Pan Wang, Yingqi Wang, Qi Chang</i>	
Design for Collaborative Robot with 6 Degree of Freedom (DOF) .....	56
<i>Zhengming Zhang, Weijun Wang, Wei Sun, Shujian Liu, Yunfei Liu, Jiyong Fan, Huarui Liu, Yangzhou Zhao, Qinghui Wang, Xingyu Cui</i>	
Modeling of Coating Growth Rate for Digital Camouflage Robotic Spraying Based on Elliptic Double $\beta$ Models .....	63
<i>Yipeng Zhong, Long Song, Jianjun Sha, Xin Du, Gongtao Zhang</i>	
Revolutionizing Loading Robot Perception: Advanced 3D Carriage Detection Technology .....	69
<i>Qianping Huang, Zhongmin Xiao, Chuixin Kong, Wenqiang Wu, Chaozheng Chen, Zhiye Ren, Mingfeng Yu</i>	

❖ **Design and Mobile Control of Intelligent Robot Systems**

Robot Localization in Complex Home Environments Based on Layered Sub-Maps and Observation Residuals..... 75  
*Wei Li, Guohui Tian, Xuyang Shao, Yongcheng Cui*

A Method for Evaluating the Mechanical Performance of Serial Robots Based on Task Requirements ..... 81  
*Shaoxiong Feng, Yufan Pi, Qi Chen, Kai Wu*

Neural Network-Based Kinetic Parameter Identification for a Wheel-legged Robot..... 86  
*Shouyan Chen, Sifan Lu, Can Wang, Xiaoqun Chen, Renyi Zhou*

Modeling of Multi degree of Freedom Pedestrian Comfort Space Based on Multidimensional Comfort Distance Inference  
..... 92  
*Futong Zhao, Guohui Tian, Tiantian Liu, Xuyang Shao*

Grasp Planning Based on Geometric Fitting with High-Quality Initial Configurations ..... 98  
*Yueming Bi, Shifeng Lin, Chenguang Yang*

Mechanical Design and Evaluation of a Bionic Aerial-Aquatic Vehicle..... 104  
*Hao Lin, Junhao Xiao, Wentao Tang, Hui Peng, Huimin Lu, Kaihong Huang*

IC-RCM: Intraoperative Real-Time Detection of 5D RCM-Misalignment in Robot-Assisted Ophthalmic Surgeries with a  
Single-Camera System..... 111  
*Alireza Alikhani, Nida Fareghzadeh, Satoshi Inagaki, Mathias Maier, Nassir Navab, M. Ali Nasseri*

An Energy Dispatch Strategy for Smart Microgrid with the Participation of Robotic Energy Storage..... 118  
*Weirong Liu, Nvzhi Tang, Jieqi Rong, Hongjiang He, Bin Chen*

Versatile Multimodal Strain Sensors for Responsive Soft Robot Applications..... 124  
*Sylvester Ndidiamaka Nnadi, Aliyu Aliyu, Khaled Elgeneidy, Amir Rahmani, Behnaz Sohani*

Current Status and Perspectives of Research on Upper Limb Rehabilitation Robots..... 129  
*Yuehua Mi, Aldrin D. Calderon*

IMU-based Teleoperation for Supernumerary Robotic Limbs ..... 134  
*Keao Wang, Shiyang Liu, Chao Zeng, Muye Pang, Jing Luo*

❖ **Advanced Technology in Spatial Perception and Robust Autonomous Navigation**

Adaptive Admittance Control for Active Compliance under Dynamic Motion ..... 140  
*Yufan Pi, Shaoxiong Feng, Qi Chen, Kai Wu*

Indoor Position Correction Assisted by Encounter Users..... 146  
*Sheng Guo, Minmin Li, You Li, Yankun Wang*

Reinforcement Learning for AI-positioning of Suspended Load By a Crane Vessel ..... 150  
*Oleg Makarov, Takashi Harada*

A Robot Navigation Method Using Restricted Minimum Spanning Tree ..... 155  
*D. Satyanarayana, Gopal Rathinam, Abdullah Said Al Kalbani, Nadir Kamal Salih Idries, Alaya Al Azzani*

Numerical Simulation System of Navigation Control with Human - machine Cooperation for Maritime Autonomous  
Surface Ships ..... 160  
*Tishuo Tao, Chenguang Liu, Zhibo He, Xiumin Chu, Mengxia Li, Songlong Li*

Research on Obstacle Avoidance Strategy for Intelligent Electric-driven Heavy-duty Vehicle Considering Dynamic  
Characteristics ..... 166  
*Jiahui Chen, Junqiu Li, Yong He, Ying Li, Yuqi Gu, Zengcheng Liu*

Research on Adaptive Particle Swarm Optimization Algorithm for Manipulator Trajectory Planning .....	175
<i>Bingtong Li, Tianxu Han, Haihong Li, Yanjun Zhang</i>	
Trajectory Prediction Method for High-Speed Aircraft Based on Unscented Transformation.....	180
<i>Bing Zhang, Hao Guo, Wei Xiong, Meng Wang, Yu Zhang, Tao Zhang</i>	
Appearance-invariant Visual Localization for Long-term Navigation .....	187
<i>Zerong Su, Xubin Lin, Li He, Zhihao Xu, Xuefeng Zhou</i>	
Robust ESO Based Control for Interval Plant: Application to Piezoelectric Positioning Stage Working at Changing Temperatures .....	195
<i>Mingchen Chen, Peng Yan</i>	
Terrain-aware Spatio-temporal Trajectory Planning for Ground Vehicles in Off-Road Environment.....	200
<i>Xiaojie Gong, Gang Tao, Runqi Qiu, Zheng Zang, Senjie Zhang, Jianwei Gong</i>	
Exploring the Impact of Social Interaction Factors on Vehicle Trajectory Prediction with Graph Neural Networks .....	208
<i>Tianyang Gao, Chunlong Qiu, Shuaipeng Liu, Weichao Zhuang</i>	
Novel Design for a Hybrid Aerial Underwater Vehicle.....	215
<i>Lei Yan, Ao Cao, Xinyuan Zhu, Hongbo Ding, Huafeng Lu, Guangrong Chen</i>	
<b>❖ Control of Neural Networks-Based Nonlinear Systems</b>	
Design and Experiment of Safflower Intelligent Picking End Effector System .....	220
<i>Bangbang Chen, Feng Ding, Baojian Ma, Xiangdong Liu</i>	
Multi-Joint Predictor for Human Upper Limbs in Human-Robot Collaboration Tasks .....	226
<i>Mengyao Zhang, Zijian Zhang, Linjian Wang, Qinghua Li, Chao Feng</i>	
Research and Design of Field Verification Device for Temperature and Humidity Controller of High Voltage Switch Cabinet.....	231
<i>Min Ding, Pei Cao, Jin Sun, Zhou Guliang, Xiang Zhang, Guoyuan Lin</i>	
Robust Volt-VAr Control Using Model Predictive Control for Grid-Connected Three-Phase Inverters .....	236
<i>Waleed Alhosaini</i>	
The Distributed Method to Birdcage RF Coils Optimization Based on Multi-agent Theory .....	242
<i>Ye Yuan, Sinan Li, Xingjian Zhao, Jie Zhao, Linyan Wu, Tian Liu, Jue Wang</i>	
Online Error Evaluation of Capacitive Voltage Transformer Based on Improved Temporal Convolutional Network Autoencoder.....	246
<i>Kun Zhou, Hongtao Wei, Wenshuo Wang</i>	
Design of Garden Disinfection Control System Based on STM32.....	251
<i>Yang Dongxiao, Lin Tongxi, Wang Li</i>	
Three-Phase Steady-State Models of Converter-Interfaced Distributed Generators with Different Control Strategies .....	256
<i>Qijia Yang, Guoliang Tian, Yiyuan Lu, Tongpeng Mu, Zhengchun Du</i>	
Nonlinear Auto-Regressive Moving Average (NARMA-L2) Controller Design for Two CSTR.....	263
<i>Husam E. Elfadel Haroon</i>	
<b>❖ Machine Vision and Image Processing</b>	
Study on Discriminant Model of Flue-curing Stage of Tobacco Leaves in Curing Process.....	269
<i>Zhicheng Wang, Lingfeng Meng, Songfeng Wang, Liangwen Xie, Wengang Li</i>	

An Adaptive Two-Step Method for Voluntary Muscle Activity Detection Using sEMG Signals with False Background Spikes .....	274
<i>Zheng Nan, Li Yurong, Zhan Miaoqin</i>	
A Fast Compression Algorithm Based on Attention-Aware for 3D Point Cloud Data.....	279
<i>Kainan Su, Yajing Zhou, Chenguang Yang</i>	
Welding Image Enhancement Based on CLAHE and Guided Filter .....	285
<i>Ao Sun, Yigang Wang, Qingqing Yang</i>	
Stereo Visual SLAM Based on Plane Features in Road Environments .....	291
<i>Yu Fan, Zhi Wang, Peng Zhang</i>	
T2Track: Multi-Object Tracking by Associating between Tracks.....	298
<i>Xiangchao Zhang, Bo Wang, Xiaodong Wei, Wenyi Huang, Bo Wang, Chao Sun</i>	
Recognition of Tobacco Leaf Curing Stage Based on Deep Learning .....	305
<i>Panzhen Zhao, Songfeng Wang, Hao Xia, Yingpeng Dai</i>	
A BiLSTM and CTC Based Multi-Sensor Information Fusion Frame for Continuous Sign Language Recognition.....	310
<i>Yuyuan Chen, Jie Li, Shifeng Lin, Yuge Xu, Chenguang Yang</i>	
A Vertical Line Feature Extraction and Optimization Method Based on Grid Maps .....	316
<i>Shouhui Liu, Bo Ji, Rui Yuan</i>	
A Novel Adaptive Extended Target Tracking Algorithm Based-on Variational Bayes Within Unknown Probability of Measurement Loss .....	322
<i>Wenbo He</i>	
Study on Recognition of Typical Curing Stages of Jiangxi Tobacco Leaves Based on Image Processing .....	330
<i>Shijiang Duan, Hao Liu, Aihua Wang, Yichong Hu, Fei Qi, Qiang Hu</i>	
<b>❖ State Monitoring and Reliability Evaluation in Advanced Power Systems</b>	
A Two-Stage Approach Based on Actor-Critic Network for Flexible Job Shop Scheduling Problem.....	335
<i>Yi Feng, Licong Zhang</i>	
Synchronous Stability Analysis Model of Grid-following Converter Based on Singular Perturbation Method .....	343
<i>Yiyuan Lu, Mengqi Liu, Chong Shao, Jingtao Lin, Guoliang Tian, Qijia Yang, Yujun Li, Zhengchun Du</i>	
Design and Analysis of High-Power Dual Three-Phase Electric Excitation Synchronous Generator with Diode Rectifiers .....	349
<i>Zuxin Luo, Sifei Meng, Chong Lou, Feifei Bu</i>	
IrisTac: A Vision-based Tactile Sensor with Chromatic and Modeled Illumination .....	356
<i>Xin Liu, Lijie Sheng, Yige Wu, Isabel Y. N. Guan, Zheng Zhu, Zhenzhong Jia</i>	
Railway Station Train Scheduling Based on Supervisory Control of DES .....	364
<i>Cengkai Li, Xi Wang, Deguang Wang, Zhiwu Li</i>	
Energy-saving and Economic Analysis of Central Air-conditioning Upgrading in Thermal Power Plants .....	370
<i>Chengjie Yin, Wang Li</i>	
A Fast Frequency Control Based on Extended Kalman Filter Using Energy Storage System .....	375
<i>Guoliang Tian, Qijia Yang, Yiyuan Lu, Tongpeng Mu, Zhengchun Du</i>	

❖ **Modern Power System and Control Technology**

Analysis and Solution of Voltage Rise Phenomenon in Small Inductive Current Switching Test of High Voltage AC Disconnecter .....381  
*Meng Shen, Zhanchuan Ma, Kesong Fan, Keze Yu, Hongjin Chen, Shizhe Wang, Chunqiang Su, Ziyu Wang*

Information Cross-district Interaction and Operation and Maintenance Value Mining of Smart Substation .....386  
*Xudong Liang, Qian Zhao, Shaopeng Li, Jing Liu, Hongxiang Pan, Jian Shen*

CVaR-Based Optimization Framework for Virtual Power Plants Aggregation .....391  
*Bing Zou, Dehui He, Jianan Liang*

Carbon Emission Quota Allocation Method Based on an Improved ZSG-DEA Model.....396  
*Fulin Zhao, Xiao Liang, Jiwen Wang, Zhengfeng Wang, Zi Yang, Weiheng Gao*

Control Strategy of the Power Quality Improvement for the Grid-Connected Inverter Based on Droop Control.....401  
*Meng Junxia, Dai Shuangyin, Li Qionglin, Wang Songcen, Liu Kaicheng*

Vibration Analysis and Simulation of an Adjustable Display and Control Terminal Arm.....406  
*Zhengming Zhang, Weijun Wang, Wei Sun, Shujian Liu, Yunfei Liu, Jiyong Fan, Huarui Liu, Yangzhou Zhao, Qinghui Wang, Xingyu Cui*

A SMOTE and XGboost Based Method for Power System Transient Stability Assessment .....414  
*Yanzhen Pang, Feng Li, Siyang Ke, Haiya Qian*

Electric Vehicle Optimal Charging Algorithm Using Reinforcement Learning.....420  
*Alok Kumar, Atul Kelkar*

Computation Method for Ionized Field on Buildings Near HVDC Transmission Lines .....425  
*Kun He, Li Xie, Bo Chen, Yifan Wang, Yong Ju, Jiayu Lu*

Anomaly Detection with Random Forest for Flexible Integrated Circuit Packaging Substrates .....430  
*Shuchao Zheng, Tuohui Zhou, Zhifu Li*

❖ **Author Index**