2024 International Symposium on **Intelligent Robotics and Systems** (ISoIRS 2024)

Changsha, China 14 – 16 June 2024



IEEE Catalog Number: CFP24DC9-POD ISBN:

979-8-3503-6480-4

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:
 CFP24DC9-POD

 ISBN (Print-On-Demand):
 979-8-3503-6480-4

 ISBN (Online):
 979-8-3503-6479-8

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-040

Phone: (845) 758-0400 Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



2024 International Symposium on Intelligent Robotics and Systems (ISoIRS)

ISoIRS 2024

Table of Contents

Iessage from General Chairxi
rogram Committee xii
Organizing Committee
eviewers xxii
r
Section 1: Robotics Algorithms and Estimation Techniques
ose Estimation Algorithm for Quadruped Robots Based on Multi-Sensor Fusion Changming Pan (Yunnan Normal University, China), Ruiting Hao (Yunnan Normal University, China), Jinheng Yu (Yunnan Normal University, China), and Longgang Zhang (Yunnan Normal University, China)
lanning in Autonomous Driving using Imitation Learning with Research on Data Aggregation \dots
Mingjing Liang (GAC R&D Center, China), Xun Gao (GAC R&D Center, China), Yulong Wang (GAC R&D Center, China), and Huan Min (GAC R&D Center, China)
daptive Climbing Strategy of Snake Robot Based on Compliance Control
ntegrating Object Detection and Optical Flow Analysis for Real-Time Road Accident Detection
Ryan Mo Xian Wee (Multimedia University, Malaysia), Tee Connie (Multimedia University, Malaysia), and Michael Kah Ong Goh (Multimedia University, Malaysia)
ehicle Overtaking Detection using Computer Vision Techniques
ire Force Allocation Algorithm for 4WID-4WIS Vehicles Considering Actuator Rate Limits 33 Runfeng Li (Tsinghua University, China), Ao Lu (Tsinghua University, China), Ziwang Lu (Tsinghua University, China), and Guangyu Tian (Tsinghua University, China)

Modeling and Simulation of a Wheel-Less Omnidirectional Robot Moving in Isotropic Invironment	38
Yuxi Gao (Beijing University of Chemical Technology, China), Chaoyue Zhao (Beijing University of Chemical Technology, China), Shuai Kang (Beijing University of Chemical Technology, China), Longchuan Li (Beijing University of Chemical Technology, China), and Fumihiko Asano (Graduate School of Advanced Science and Technology, Japan)	50
CT-YOLOv7: Enhancing YOLOv7 for Bird Nest Detection on Power Transmission Lines Luyi Wang (Beijing Jiaotong University, China) and Junkai Yang (Beijing Jiaotong University, China)	43
Classification of Underwater Fish Image Based on Supervised Contrastive Learning	48
A Survey of the Present Landscape and Prospective Trajectories in Rescue Robots	54
An Obstacle Avoiding Motion Planning Method for Manipulator using Progressive Dynamicocal Search	
Modeling and Simulation of Horizontal Rotational Movements for a Tandem Multibody A Inder Varied Thrust Configurations	
An Efficient Multi-UAV Policy Learning Method Under Binary Rewards	70
Automatic Piano Melody Generation Method Integrating Note Starting Point Detection an Multiple Fundamental Frequency Estimation Algorithm Shasha Chen (Shaanxi Railway Institute, China)	
Computer Vision Technology Based on Color Quantized Image Global Matching Algorithm Yan Wang (Chengdu Industry & Trade College, China)	m 83
Research on the Construction of Digital Trade Volume Production Model Based on Combi Model	
Inhancing Emergency Braking Intention Recognition Accuracy Based on EEG Spatiotempolectivation Mapping	

Network and OpenCV
Zhijie Zhou (Qingdao Preschool Education College, China), Bin Lin (Qingdao Preschool Education College, China), Nianwei Zhang (Qingdao City University, China), and Huiyu Li (Qingdao City University, China)
Self-Data-Driven Electromechanical Coupling Model Construction of Industrial Robots
A ProMPs-Based Framework for Robot Variable Impedance Skill Acquisition
Section 2: Robotic Design and Mechanisms
Cable: Design of a Transmission-Type Snake Rescue Robot
Developing a Pseudo-Rigid-Body Dynamics Model for Pneumatic Serpentine Robots
Kinematic Analysis of Redundant Cable-Driven Mechanical Arms Based on the Effects of Friction and Deformation
Design and Development of a Dual-Mode Autonomous Underwater Vehicle for Long-Term Stationary Observation
A Simple Sand-Skier with Internal Excitation

Enhancing Weakly Supervised Point Cloud Semantic Segmentation via Dynamic Label Propagation and Pseudo-Label Optimization
Few-Shot Aviation Materials Surface Defection Classification: From Non-Standardized Image Acquisitions
Metal Capacitive Micro-Pressure Sensor Diaphragm Welding Technology
Section 3: Robotics in Safety and Security
Lower Limb Motion Measurements During Walking by Setting Rotation Angle and Period of the Motor for Driving the Chest Pad of a Rollator
Research on Optimization of Personnel Evacuation Path in Hazardous Chemical Leakage
Accidents
Integrating Federated Learning for Privacy Protection in Intelligent Home Care Robots
Design of Intelligent Monitoring System for Greenhouses Based on PLC and Landscape King . 176 Li Zhou (Guangdong Polytechnic Normal University, China; Research Institute of Guangdong Polytechnic Normal University, China), Mingzhang Mo (Guangdong Polytechnic Normal University, China), Zehao Dong (Guangdong Polytechnic Normal University, China), and Liangyou Che (Guangdong Polytechnic Normal University, China)
Research on Environmental Engineering Education Robot Information Intelligent Recommendation Based on Collaborative Model
Inspection and Firefighting Robot Based on Improved SVM Algorithm in Ship Automation Engine Room

YOLOv8
Chao Huang (Shenyang Aerospace University, China), Zhijun Guo (Liaoning Planning and Design Institute of Posts and
Telecommunications, China), and Qi Sun (Shenyang Aerospace University, China)
Section 4: Human-Robot Interaction and User Experience
Research on the User Experience of Smart Vehicle Interaction in the Context of Family Driving Outings Travel
Research on the Recognition of Students' Abnormal Classroom Behaviors by New Media Robot in Ideological and Political Education Based on HRNet Network
Design of New Media Robot Psychological Counseling Automatic Question Answering System fo Ideological and Political Education Based on Improved Seq2seq
A Robot Dialogue System Based on Deep Learning in Situation and Policy Teaching
Piano Performance Techniques Based on Finger Motion Feature Capture Guide the Robot Analysis
Section 5: Robotics in Manufacturing and Industry
Roadway Disease Identification Based on RANSAC and A-Shape in the Context of BIM Technology
Technology
Ying Wang (Nanjing Vocational Institute of Transport Technology, China) Sampling Point Method: A Generalized Algorithm for Class-Incremental Learning of Linear Model
Ying Wang (Nanjing Vocational Institute of Transport Technology, China) Sampling Point Method: A Generalized Algorithm for Class-Incremental Learning of Linear

Research on Virtual Simulation Design of Intelligent Production Line Based on Visual Components and PLC
Li Zhou (Guangdong Polytechnic Normal University, China; Guangdong
Polytechnic Normal University, China), Zehao Dong (Guangdong
Polytechnic Normal University, China), Mingzhang Mo (Guangdong
Polytechnic Normal University, China), and Liangyou Che (Guangdong Polytechnic Normal University, China)
Research on Financial Service Robot Chat System Based on Text Matching
Section 6: Robotics and Intelligent Systems
Economic Cost Analysis and Scheduling Optimization Based on DPC Swarm Intelligence and Improved MOABC
Yue Zhang (Southwest Jiaotong University Hope College, China) and Yuyin Pei (Chengdu Rail Transit Resource Operation and Management Co., Ltd, China)
Implementation of Fault Diagnosis Technology of EMU Bearing Based on VMD and Neural Network
Hongyan Gao (Wuhan Railway Vocational College of Technology, China) and Youqing Shi (China Railway Wuhan Group Co., Ltd, China)
An LLM-Based Intelligent System for the Evaluation of Property Geographical Environment 258 Yuanhong Ma (Shenzhen University, China), Tianyang Zhang (Shenzhen University, China), and Ge Zhan (LSCM Research Centre, The University of Hong Kong, China)
Semi-Dense Map Reconstruction of Bronchus Based on Prior Feature Correlation
Design of Joint Simulation System of Industrial Robot Training Equipment Based on RobotStudio and TIA Portal
Li Zhou (Normal University, China; Guangdong Polytechnic Normal University, China), Liangyou Che (Guangdong Polytechnic Normal
University, China), Zehao Dong (Guangdong Polytechnic Normal University, China), and Mingzhang Mo (Guangdong Polytechnic Normal University, China)
Research on Assessment and Evaluation Method Based on Sensor Technology and Machine Learning in College Physical Education Classroom
Research on Automatic Question Answering System for Online Educational Robots Based on Deep Learning
Digital Trade Related Policy Text Classification and Quantification Based on TF-IDF Keyword Algorithm
Huicong Hu (Zhengzhou university, China), Jiatong Chen (Zhengzhou University, China), and Huijing Hu (Xinyang Normal University, China)
Multi-Sensor Data Fusion Based on Fuzzy Theory and FWA-BP Neural Network

Investigation and Implementation of an Algorithm for Dynamic Gesture Recognition using Educational Robots	. 294
Sisi Liu (Hunan College of Foreign Studies, China)	
A Transformer-Based Video Segmentation Method for Road Weather Conditions	. 299
Hybrid Model Based on Machine Learning for the Prediction of Consumer Credit Delinquency in the Banking Sector of Peru	7 305
Digital Media Design Based on Human-Computer Interaction and Image Processing	. 309
Effective Bot Management Strategies for Web Applications	. 314
Author Index	. 32 3