2022 5th International Conference on Mechatronics, Robotics and Automation (ICMRA 2022)

Wuhan, China
25-27 November 2022

IEEE

IEEE Catalog Number: CFP22P26-POD
ISBN: 978-1-6654-7266-1

Copyright © 2022 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:	CFP22P26-POD
ISBN (Print-On-Demand):	978-1-6654-7266-1
ISBN (Online):	978-1-6654-7265-4

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

2022 5th International Conference on Mechatronics, Robotics and Automation (ICMRA 2022)

Table of Contents

Preface ..... **vii**
Conference Committees ..... **viii**

➢ **Robot Structure Design and Motion Control**

An Autonomous Obstacle Avoidance Path Planning Method Involving PSO for Dual-Arm Surgical Robot ... 1
Qiao Chen, Yiwei Liu, Zhuo Chen, Yangjunjian Zhou

Design and Simulation of a Hexapod Robot with Dual Robotic Arms 7
Yimin Wei, Xiaoqing Zhu

Neural Network Based Friction Compensation of Motion Control on A 6-DoF Robot Manipulator 14
Xiaozhi Zhang, Liangyu Chen

Model Free Safe Control for Reinforcement Learning in a Clustered Dynamic Environment 19
Guiliang Zheng, Minhao Yang, Yuxuan Wu

Decision Tree Based Decision Optimization Algorithm for Yangqin Performance 27
Lin Wei-Lun

Dynamic Analysis of the Human-Machine System of a 4-Bar Gait Constraint Mechanism 31
Lailu Li, Lixun Zhang, Bing Wang, Da Song

Design and Research of Intelligent Mechanized Ridge-up Bed Trail Machine for Root Crops 36
Wenliang Liu, Gang Luo, Caiyu Jiang, Runjian Dong, Liang Zhang, Jiang Li

➢ **Control Theory and Control System**

Design and Experiment of Distributed Seawater Carbon Sequestration Equipment 42
Shuai Deng, Zheming Zhuang, Zhiwei Wang, Qingyu Bu, Kaiwen Hu, Yifei Gao, Yuntao Guan, Jiansheng Dai

Magnetic Levitation Control System Based on ADAMS-MATLAB Co-simulation 47
Bingkun Pan, Hongze Xu

Sinusoidal Vibration Control Technology of Two Degrees of Freedom Electro-hydraulic Shaking Table 53
Zhongli Jiang, Guangfeng Guan

Adaptive Disturbance Observer-Based Trajectory Tracking Control for the Follower of Close Formation UAVs 58
Hengyuan Chang, Dawei Lu, Xin Peng, Dehua Chen, Gun Li, Changrong Zhang

Combined Supercapacitor and Battery Sliding Mode Control for Aeronautic Application.....64
Antonio Russo, Marco Costanzo, Alberto Cavallo

GUI Composer: A Lightweight GUI Software Development Framework for WSN, I.o.T and Control System Application.....69
Ejinaka C. Reuben, Li You Meng

Digital Control Method of Bucket Truck Based on DH Parameter Modeling 74
Xu Jian, Beinuo Huang, Yan Zhang, Jinbin Li, Xin Chen, Shangchao Xu

➢ Modern Electronic Information System and Control Technology

Plasma Ring Transportation Feature Parameters Optimization and Dynamics Analysis with Multiobjective Particle Swarm Optimization 79
Hongliang Zhao, Yuanwen Zhang, Leping Yang, Huan Huang, Xi Long, Tian Ma

Experimental Study on Semi-active Vibration Absorption Method for Flexible Antenna Structure 85
Jiale Peng, Peng Liu, Yushu Bian, Yechi Zhang, Qiang Cong, Yizhu Guo

Parachute Deployment Fault Identification and Landing Point Prediction of Spacecraft Recovery System Based on Swin Transformer and Edge Detection 90
Yilan Bai, Qibin Hu, Yu Long, Ke Ma, Chuangye Zhao, Mengying Zhang

Factory Worker Safety Mask Monitoring System Based on Deep Learning and AI Edge Computing.....96
Donghui Fang, Liguo Tian, Meng Li, Yuesong Wang, Jinqi Liu, Xiang Chen

Finite Element Analysis for Tread Wear of Radial Tire..... 101
Runfeng Li, Yiwen Sun, Yunchang Yu, Guangyu Tian

Intelligent Waste Sorting Platform Based on Taurus & Pegasus 107
Xiang Chen, Liguo Tian, Meng Li, Jinqi Liu, Yuesong Wang, Donghui Fang

➢ Motor Design and Performance Simulation

Implementation of SVPWM Algorithm in Sensorless Motor Based on Different Microcontrollers 112

Rui Sun, Mingjiang Wang, Changjun He, Yiwen Zhang

Design and Simulation of a Tubular Permanent Magnet Linear Generator with Doubly Salient Structure 118

Yongnan Chen, Lei Mei

Research on On-line Prediction of Contact Resistance and Maximum Load Capacity of Switchgear Cabinet in Operation 123

Jieshuai Ren, Hongbing Li, Zifan Dong, Song He, Jinbin Li, Borui Niu

➢ Image Detection and Analysis in Engineering Control System

Grabbing Strategy of Single-Line Lidar Imaging of Stack Based on Genetic Algorithm 128

Chen Tong, Hancheng Yu, Xin Zhu, Yuhan Lv

Moving Target Recognition in Noisy Environment Based on Sound Seismic Fusion Signal and PSOSVM 134

Jingwei Song, Nan Wang, Kunsheng Xing

Defect Detection Algorithm for TFT-LCD Circuits Based on Modified YOLOX Model 139

Yan Xia, Chen Luo, Lei Jia, Yijun Zhou

A Mobile-Transformer Algorithm for Car Paint Defect Detection 146

Zhaolin Jiang, Xueyuan Hu, Sunxin Wang

A Fall Detection Algorithm Based on Improved MobileNetV2 151

Mengqi Gao, Jiangjiao Li, Bin Li

Distributed Multi-target Tracking by Multi-AUV Based on PMB Filter in Underwater 158

Yuexing Zhang, Yiping Li, Shuo Li, Junbao Zeng, Liang Li, Yiqun Wang, Hailin Wang

➢ Power Grid Control and Monitoring

Research on the Improvement of Power Quality of Low-Voltage Power Grid Based on Back-to-Back Photovoltaic and Energy Storage Converter 163

Zou Yu, Guo Zipei, Zhang Jing, Zhang Kun, Fu Deyu

Energy Efficiency Optimization of CCHP Microgrid Energy Hub with Multiple Scenario Model 172

Ruichun Wu, Lintong Wang, Haiba Xu, Xueyan Wang, Chouwei Ni, Yitian Hong

A Nonlinear Model Based on Data-Driven Control for Cascading Failure in Power Grids..... 177

Beibei Li, Kefan Song, Linfeng Chen, Aohui Jia

Author Index