

2022 International Conference on Mechanical and Electronics Engineering (ICMEE 2022)

**Xi'an, China
21-23 November 2022**



**IEEE Catalog Number: CFP2216K-POD
ISBN: 978-1-6654-9221-8**

**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:	CFP2216K-POD
ISBN (Print-On-Demand):	978-1-6654-9221-8
ISBN (Online):	978-1-6654-9220-1

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

CURRAN ASSOCIATES INC.
proceedings
.com

2022 International Conference on Mechanical and Electronics Engineering

Table of Contents

Preface.....	viii
Committees.....	ix

Chapter I: Motor Design, Modeling and Control

Permanent Magnet Synchronous Motor Speed Control Method with Fractional Order Disturbance Observer	1
<i>Changhong Li, Gaosheng Zhang, Chongwei Han, Jingyan Hou, Yanfeng Liu, Jie Ma</i>	
Research on Vector Control Strategy of Three-Phase PMSM Based on PR Controller	6
<i>Ruiqiang Pu, Hao Qiao, Haopeng Li, Shichao Luo</i>	
Prescribed Performance-Based Finite-Time Neural Adaptive Backstepping Control for the Chaotic PMSM.....	11
<i>Fengbin Wu, Junxing Zhang, Shaobo Li, Shaoyang Li, Xiao Wu, Shuai Wang</i>	
Vector Control Strategy of PMSM Based on Current Sensorless	19
<i>Gongruizi Li, Binbin Zhang, Chaobo Chen, Jichao Li, Song Gao, Suping Zhao</i>	
FPGA Implementation of Division Algorithm for SVPWM.....	25
<i>Gaosheng Zhang, Chongwei Han, Changhong Li, Yanfeng Liu, Jie Ma, Yani Lei</i>	
Model Predictive Direct Torque Control Based on Active Disturbance Rejection Controller for PMSM	30
<i>Hucheng He, Haoya Gui, He Shao, Jiangbo Gao</i>	
Design and Structural Analysis of a Maca Freeze-Dryer for the Peruvian High Andean Zones Using VDI 2221	36
<i>Beyker Quispe, Karolina Solorzano, Marvin Blancas, Deyby Huamanchahua</i>	
Positionless Control of PMSM Based on Improved Sliding Mode Observer.....	41
<i>Shichao Luo, Ruiqiang Pu, Yating He, Hao Qiao</i>	
Design and Analytical Modeling of a Novel Permanent Magnet Synchronous Coupling for Switch Machine ...	46
<i>Jiarui Shi, Desheng Li, Shuren Yang, Wenmeng Yang, Benzhen Guo</i>	

Chapter II: New Sensor Monitoring and System Control

A Cluster Tracking Control Method Based on Consensus of Switched Stochastic Multi-agent Systems.....	51
<i>Xue Bing, Zhang Shuo, Cai Suting, Zhou Yukang</i>	

Adaptive Distributed Fusion Estimation for Multi-sensor Nonlinear System with Bounded Noise.....	56
<i>Jiao-ru Huang, Si-meng Zhang, Fu-cai Qian</i>	
Design and Optimization of a Fast Steering Mirror Closed-Loop Controller	62
<i>OuYang Diansheng, He Zhian, Chen Ning, Fan Shixun</i>	
Formation Tracking Control Design for Uncertain Artificial Swarm Systems.....	67
<i>Jiale Zhang, Ruiying Zhao, Shengjie Jiao, Yapeng Wang</i>	
PMSM Sensor Fault Diagnosis Method Based on Second-Order Sliding-Mode Observer	73
<i>Ji Xin, Chaobo Chen, Song Gao, Suping Zhao, Binbin Zhang, Jichao Li</i>	
The Research of the Fast DC Bus Control System Based on Non-isolated Bi-directional DC/DC Controller...	82
<i>Zhuoxiao Li, Chongwu Wang, Caishuai Duan, Hong Li, Shangteng Qi, Ning Zhang</i>	
Research on Fault-Tolerant Control of Cascaded H-Bridge Seven-Level Inverter Based on FPSC	88
<i>Chaobo Chen, Ziwei Yin, Kun Wang, Binbin Zhang, Song Gao, Youmin Zhang</i>	
An Internal Model Control Design for A Vapor Compression Refrigeration Benchmark Control System (PID18)	95
<i>Jairo Viola, Yangquan Chen, Luis Angel</i>	
Research on Horizontal Path Tracking Control of a Biomimetic Robotic Fish	100
<i>Jinhao Liu, Xiaoru Song, Song Gao, Chaobo Chen, Kang Liu, Tonghui Li</i>	

Chapter III: Intelligent Robot Design and Motion Control

Design Harmonic Drive for Application in Robot Joint	106
<i>ThanhTrung Trang, ThanhLong Pham, QiNing Yin, QingWei Wang, YueMing Hu, WeiGuang Li</i>	
Voronoi Coverage Based on Improved Artificial Potential Field	114
<i>Kai Cao, Jiahao Zhang, Yangquan Chen, Song Gao, Shanshan Lang, Yunbo Wei</i>	
Research on Vehicle Cruise Control Strategy Based on Fixed Distance.....	122
<i>Cheng Jianfeng, Du Feng, Qi Lei, Zhang Shen, Du Qiong, Ji Penghao</i>	
Modified Prescribed Performance Control for the Full-State-Constrained Robotic Manipulator.....	127
<i>Menghan Li, Junxing Zhang, Shaobo Li, Shaoyang Li</i>	
Autonomous Excavation Trajectory Generation for Trenching Tasks Based on Skills of Skillful Operator.....	134
<i>Jiangying Zhao, Peng Tan, Yongbiao Hu, Mingrui Tian, Xiaohua Xia</i>	
Design of an Autonomous Biped Robot Based on Modularization.....	139
<i>Wang Shujian, Guan Zhiwei, Chen Qiang, Qi Lei, Sun Fengyi, Shi Zhehui</i>	
Dynamic Feedforward Based Fractional Order Impedance Control for Robot Manipulator.....	144
<i>Yixiao Ding, Ying Luo</i>	
Bionic Design of Quadruped Mechanical Horse	151
<i>Qingshan Wu, Yanfeng Xue, Hongqiang Wan, Junhao Qiu, Zhijun Wang, Na Kang</i>	

Chapter IV: Power Supply and Transmission System Analysis

Responses of Existing Cable Channel Induced by Adjacent Foundation Excavation.....	157
<i>Zhongyuan Shen, Lankang Zhu, Huangxu Ge, Renjie Zhu, Jian Wang</i>	
Study on Human Exposure to Power Frequency Electric Field under UHV Transmission Line	162
<i>Li Ying, Liu Dawei, Zhang Jia, Wu Lin</i>	
Parallel Hybrid Wireless Charging with Misalignment Tolerance and Constant Current Output.....	167
<i>Zhaowei Gong, Qian Shi, Jingang Li, Xiangqian Tong</i>	
Study on Interference Model and Anti-interference Method of Electronic Transformer under very Fast Transient Electromagnetic Interference	173
<i>Yin Yusong, Zuo Shaoqi, Zhu Bainian, Jiang Nan</i>	
Influence of PWM Modulation on the Performance of BLDCM driven Helicopter Landing Light System.....	182
<i>Yating He, Hao Qiao, Shichao Luo, Ruiqiang Pu</i>	
Research on Lightweight Technology of Spacecraft Special Cable	187
<i>Chenhua Zhang, Zhanjun Xia, Huifang Du, Ran Zhang, Zhenming Zhang, Ying Zhang</i>	
A Study of EV Charging Strategies Based on Game Theory	193
<i>Zhongqin Liu, Changhong Li, Xiaohua Song, Siling Wang, Haopeng Li, An Liu</i>	

Chapter V: Electronic System Design and Performance Analysis

Parametric Three-Dimensional Modeling of Underground Cable Channels on Flac3D/Python	198
<i>Zhongyuan Shen, Lankang Zhu, Huangxu Ge, Renjie Zhu, Jian Wang</i>	
Resonant Cavity Backscattered Light Detection Method with Orthogonal Digital Lock-in Amplifier Combined with Kalman Filter	203
<i>Chao Ma, Song Gao, Bin Liu, Yaya Wang</i>	
Emission Spectrum Analysis of SF ₆ under Spark Discharge and Surface Discharge	208
<i>Yujie Li, Hanyan Xiao, Jingtian Ma, Ke Zhao, Hongtao Li, Shan Gao, Dong Han</i>	
On the Operation of Wind Power Stations.....	213
<i>Na Wang, Xinshe Qi, Cuicui Gao, Yuyi Li</i>	
Modelling and Analysis of Electro-Mechanical Actuator Servo System with Nonlinear Factors	219
<i>Qi Wan, Geng Liu, Shangjun Ma, Ruiting Tong</i>	
A 3D Printed Cubic Antenna Array for 2.4 GHz Wireless Communications	224
<i>Xingzhi Xiao, Linghui Shi, Difan Wu, Linghui Kong</i>	

Chapter VI: Machine Vision and Measurement Technology

Fast Detection Method of Chemical Plant Equipment Based on Improved YOLOv5 Network	228
--	-----

Kai Cao, Ge Zhang, Yangquan Chen, Chaobo Chen, Kang Li, Fan Yang

Synergistic Perception of the Binocular Imitating Human Eyes	236
<i>Zhaokai Ge, Xiaohua Xia, Xufang Qin, Gangfeng Wang, Haoming Xiang, Yusong Cao</i>	
Application of Fast Template Matching in Recognition of Seam Points of Steering Wheel	241
<i>Yangyang Liu, Daxin Xin, Chuhan Wang</i>	
A Portable Visual Assistant System for Driving Crawler Construction Machinery up and down Flat Transport Vehicle	246
<i>Xiaohua Xia, Jian Chen, Chang Dong, Qian Zhao, Yongbiao Hu, Haiying Cheng</i>	
Research on Character Recognition in Mechanical Process Card Based on CRNN and Logical Reasoning	251
<i>Lü Zhigang, Chen Zhiwen, Wang Hongxi, Li Liangliang, Wang Peng, Li Xiaoyan</i>	
EMG Based Gesture Recognition by Visual Method for Human-Machine Interaction and System Health Management	257
<i>Dacheng Jiang, Shihao Song, Yizhang Xia</i>	
A Halving Rectangles Sampling High Dimensional Model Representation Algorithm	263
<i>Peiyu Qin, Diantao Zheng, Ningchao Zhang, Tianli Ma</i>	

Chapter VII: Intelligent Image Analysis and Application

Identification Technology of Factory Personnel Based on Improved Strong-Baseline.....	273
<i>Haopeng Li, Wang jingcheng, Pu Ruiqiang, Song Xiao-ru, Liu Zhongqin</i>	
Simulation of Multi-focus Image Acquisition	277
<i>Yusong Cao, Xiaohua Xia, Haoming Xiang, Zhaokai Ge, Dianbin Yang, Yaoyao Wang</i>	
3D Measurement Based on Structured Light Digital Micromirror Projection System.....	282
<i>Zhang Jialin, Wang Jianhua, Du Hubing, Zhang Yadong</i>	
3D Laser Point Cloud Based Vehicle Target Recognition Algorithm	286
<i>Jianhua Yang, Xuan Zhao, Yuanyuan Fang, Fuyuan Liao, Rong Feng, Pingping Wu</i>	
An Image Enhancement Method for the Vision Surveillance of Bridge Cable Anchorage Zone	292
<i>Yiqing Zou, Xiaohua Xia, Xiheng Liu, Wei Shi, Lijun Jiang, Qi Su</i>	
Airport Foreign Object Detection Algorithm Based on Binocular Parallax.....	298
<i>Cai Xun, Yang Heng Zhan</i>	
Research on Visible Light Pedestrian Detection Algorithm Based on Improved YOLOv5m.....	305
<i>Tonghui Li, Xiaoru Song, Song Gao, Chaobo Chen, Kang Liu, Jinhao Liu</i>	
Research on Foreign Object Debris Detection Algorithm	312
<i>Xu Jia Hao, Yang Heng Zhan</i>	

Chapter VIII: Gear Transmission System and Fault Detection

Technology

Application Research of Digital Twin Driven Manufacturing Production Line Design	319
<i>An Liu, Shoumin Wang, Yongsheng Fu</i>	
Loading Condition Monitoring of Asphalt Mixture in the Mixing Station Based on Semantic Segmentation ...	326
<i>Yaoyao Wang, Xiaohua Xia, Yongbiao Hu, Mingrui Tian, Jiangong Su, Tao Guo</i>	
A Numerical Analysis Method of the Churning Power Loss of a Planetary Gear System	332
<i>Shenlong Li, Xiaohua Song, Suping Zhao, Chaobo Chen</i>	
A Vibration Diagnosis Method for Detecting the Faults in the Planet Gear System.....	336
<i>Jing Liu, Xinbin Li, Yan Cheng, Hongwu Li, Jin Xu</i>	
A Simulation Analysis of the Meshing Efficiency of a Spur Gear System Considering the Tooth Deformation	343
<i>Shenlong Li, Xiaohua Song, An Liu, Chaobo Chen</i>	

Author Index