

# **2023 9th International Conference on Mechanical and Electronics Engineering (ICMEE 2023)**

**Xi'an, China**  
**17-19 November 2023**



**IEEE Catalog Number:** CFP2316K-POD  
**ISBN:** 979-8-3503-0715-3

**Copyright © 2023 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:	CFP2316K-POD
ISBN (Print-On-Demand):	979-8-3503-0715-3
ISBN (Online):	979-8-3503-0714-6

**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)

# **2023 9th International Conference on Mechanical and Electronics Engineering**

## **(ICMEE 2023)**

## **Table of Contents**

Preface.....	xi
Committee .....	xii

---

### **1. Sensor Based Communication System and Signal Estimation**

Permittivity Retrieval Based on Fully Connected Neural Networks .....	1
<i>Xiaofeng Li, Xiaoqing Yang, Bo Ta</i>	
Research on Pavement Monitoring System of “Jingang Expressway” Based on Remote Data Transmission of 4G Networks .....	6
<i>Yuting He, Yi Zhang, Min Ye</i>	
RIS-assisted Cooperative Positioning for Smart Vehicles with Extended Kalman Filter and AOA Measurements .....	10
<i>Haonan Zhang, Bobin Yao, Yanbo Li, Qisheng Wu</i>	
Distributed Fusion Estimation for Multi-sensor with Bounded Noise .....	16
<i>Shuqi Wei, Jiaoru Huang</i>	
AUV Communication Reliability Analysis Based on Discrete Markov Theory.....	21
<i>Shanshan Jiang, Shunli Wang, Yihong Zhou, Yan Tang</i>	
Eigenvalue-based Spectrum Sensing and Throughput in FD CR-IoT Networks using Machine Learning .....	27
<i>Md Sipon Miah, Md Mahbubur Rahman, Md Ashek Raihan Mahmud, and Mingbo Niu</i>	
Design of ultrasonic power supply matching network and frequency auto-tracking.....	33
<i>Zhitong Duan, Xianwu Gong, Kun Zhang, Kang Xiangli</i>	
Signal Denoising Method Based on EWT-FE-NLM .....	38
<i>Liu Tengfei, Huang Jiaoru, Qian Fucai</i>	
Covert Communication Assisted by Friendly Jammer with Jamming-Monitoring Channel Uncertainty.....	43
<i>Fei Yu, Chaowen Liu, Zhengmin Shi, Menghan Lin, Tong-Xing Zheng, Bobin Yao</i>	
Joint Communication and Computation Resource Scheduling of a Solar-Powered UAV-Assisted Communication System for Platooning Vehicles.....	49
<i>Hangyu Tian, Maode Yan, Liang Dai, Panpan Yang</i>	

Kuhn-Munkres Combined Heterogeneous Multi-Agent DRL for Joint Resource Allocation and Power Control Design in V2X Networks .....	55
--	----

*Yansu Hu, Zijian Lou, Ziqing Zhu, Tangwen Xu*

## 2. System Monitoring and Control Technology in Power Electronic Systems

Design of Partial Discharge Monitoring Imitation Test Device for Power Cable .....	61
--	----

*Li Chenyang, Wang Lingzhi, Li Cheng*

Design of High-Precision Capacitive Touch Electrodes and Coordinate Detection Algorithm.....	66
--	----

*Lei Fan, Houjin Chen, Jupeng Li, Lijie Hou*

A Novel Radome Assessment and Transmission Test System Based on Near Field Measurement.....	71
---	----

*Ying Xin, Pengfei Fu, Anthony Mannion, Nicolas Detalle*

Research on the Tunnel Ventilation Control Method Based on Linear Active Disturbance Rejection* .....	75
---	----

*Changxuan Zhou, Yingying Ding, Yimeng Wang, Xue Li, Yanzhong Wang*

Apple Maturity and Defect Detection Using Improved YOLOv5 .....	81
---	----

*Haodong Guo, Chaobo Chen, Suping Zhao, Xiaohua Song, Kun Yan, Binbin Zhang*

Incipient Fault Monitoring Method Based on Quadratic Kernel Entropy Component Analysis and Its Application .....	87
--	----

*Xuhang Chen, Min Xu, Mingyi Yang, Yong Li, Fuzhou Feng*

Research on Map Building and Path Planning Algorithms for Autonomous Navigation Robots in Tunnel Scenarios .....	93
--	----

*Han Kou, Huanggang Liang, Rui Kang, Huixia Zhao*

Novel Four-Level Hybrid-Clamped Converter based Power Conversion System for Energy Storage Systems .....	99
--	----

*Zunmin Ma, Tong Zheng, Kui Wang, Limin Hou, Zedong Zheng, Yongdong Li*

Design of the Fuel Supply System for the Fuel Dispenser Patent Test .....	106
---	-----

*Haiyang Li, Yanzheng Liang, Xinhong Yao, Biliang Zhan*

Senseless Control Method for PMSM Based on Full Speed Range Observer .....	111
--	-----

*Hai Lin, Sanqiang Wu, Chunran Song, Yixin Huang*

Design of a High-precision Real-time Detection Oil Pipeline Leakage Alarm System G300 .....	116
---	-----

*Lu Zhao, Sen Xiong, László Czap, Xian Jia*

Target Distribution based High-speed UUV Underwater Searching Trajectory Planning Method .....	125
--	-----

*Zhong Wang, Jianan Yang, Jianguo Lv, Guanjinzi Yang, Rui Lv, Hui Fan*

## 3. System Monitoring and Control Technology in Power Electronic Systems

Research on tunnel fire control monitoring system based on single chip computer .....	135
---	-----

*Lan Wang, Fuhua Yu, Shaojie Tang, Zichen Kang*

Engineering Implementation of SOH Estimation and RUL Prediction for Power Battery Based on Sparse Sampled Data.....	140
<i>Jingjinge Lv, Rui Wang, Kang XiangLi, ChunLing Wu, Zhen Zhang</i>	
Design of Variable Structure Constant Current and Constant Voltage Output Wireless Charging System .....	146
<i>Qian Shi, Wei Jing, ZhaoWei Gong, Peng Wang</i>	
Thermal Runaway Fault Diagnosis for Battery Systems Based on Correlation Coefficient and Local Outlier Factor .....	150
<i>Yongqiang Jia, Zhengchao Lei, Jian Ma, Kang Xiangli</i>	
Remaining Useful Life Prediction of Lithium-Ion Batteries on Electric Vehicles based on LSTMAttention .....	156
<i>Jiawei Ma, Xianwu Gong, Zhengchao Lei, Lu Ding, Zixuan Xu, Yucheng Ma</i>	
Solving the Algebraic Loop Problem in FMI Specification .....	162
<i>Jialei Chen, Huanchao Du, Ying Liu, Dan Li</i>	
Hybrid Genetic Particle Swarm Algorithm for Radar Collaborative Interference Allocation.....	168
<i>Yuhang Meng, Panpan Yang, Liya Zhu, Yansu Hu</i>	
Energy-Decoupled Modes (DMs) and DMs-Based Far-Field to Near-Field Transformation of Metasurface Apertures (Meta-Apertures/Metapertures) .....	174
<i>Ren-Zun Lian</i>	
Research on Electric Field Distributions of Gas Chambers of Double-fracture Disconnect Switches for 110kV Gas Insulated Substations In-service Expansions .....	186
<i>Jiangang Yin, Zhen Wang, Jieshuai Ren, Yuanqing Dong, Yu Li, Jun Chen</i>	
Scheduling Strategy for Highway Mobile Energy Storage Vehicles .....	190
<i>Dawei Wang, Hongke Xu, Liang Dai, Chunyang Zhang, Lina Zhang</i>	
Volume Optimization Simulation Design of Permanent Magnets for New Energy Electric Vehicles.....	196
<i>Bin Xu, Aldrin D. Calderon</i>	
Electromagnetic Modal Analysis for Metasurface-Loaded Waveguide Apertures and Waveguide-Loaded Metasurface Apertures.....	203
<i>Ren-Zun Lian</i>	
<b>4. System Monitoring and Control Technology in Power Electronic Systems</b>	
Effect of Blade Number on Open Water Performance of Ducted Propeller .....	216
<i>Yunhai Li, Jie Bai, Xiaohui Liu, Hongliang Zhang</i>	
A Unmarked Knee Joint Angle Calculation Method for Gait Analysis .....	221
<i>Pei Tian, Fang Lv, Jialiang Wang, Genghao Guo, Jing Zhang</i>	
A Non-cooperative Shared Control Strategy with Dynamic Authority Allocation .....	226
<i>Herong Zhu, Yisheng An, Hao Li, Haijing Ning</i>	

Event-Triggered Multi-intelligence Based Coherent Control.....	232
<i>Xuefeng Yu, Xiaoru Song</i>	
Combined Optimization Design of Coupling Mechanism of HWPT System Based On Multi-Physical Domain..	237
<i>Xiwei Zhou, Yueling Zhang, Yehong Bai, Chengyan Zhang</i>	
High-Precision Machining Technology and Precision Inspection of Variable Tooth Thickness Involute Gear....	243
<i>Chen Yan, Chen Yonghong</i>	
Performance Analysis of Deep Reinforcement Learning-based Traffic Signal Control System at Urban Bottleneck Sections .....	247
<i>Pengfei Du, Liang Dai, Yingying Ding, Hongke Xu</i>	
Multi-model Adaptive Control Based on Heuristic Algorithms .....	253
<i>Chenggang Zhang, Hengzhan Yang, Shiyuan Li, Dian Xi</i>	
A Deep Reinforcement Learning-Based Cooperative Traffic Signal System Through Dual-Sensing Max Pressure Control.....	258
<i>Tianwen Yan, Lei Zuo, Maode Yan, Jinqi Zhang</i>	
Internal Model Based Adaptive Speed Controller Design for PMSM Servo System.....	265
<i>Hui Song, Zhaowu Ping, Yingjie Jia, Yunzhi Huang, Jun-Guo Lu</i>	
Stability Analysis for Vehicle Platoon with Time Delay Under the TPLF Topology .....	271
<i>Yongming Shen, Xu Zhu</i>	
<b>5. Modern Intelligent Monitoring Systems and Fault-Tolerant Control</b>	
Design and Application Research of Scene Twin Emergency Event Disposal System.....	277
<i>Haiyang Jiang, Junsuo Qu, Tiancheng Han, Dan Yang, Xiaochen Qu, Xiang Sun</i>	
Research of the Key Technology of Laying High Voltage Cables Using Municipal Tunnels and Bridges .....	282
<i>Yumeng Jiang, Yuchen Qi, Jie Wang, Kun Xue, Tianli Song, Shihao Wang, Haoen Li, Ruanming Huang, Longsheng Cai, Xiupeng Zhu</i>	
Critical wind Speed Prediction in Tunnel Fire by Attention-based Neural Network.....	287
<i>Quan Xu, Jian He, Xueguang Zhang, Xiaobo Xu, Huagang Liang, Qiulu Li, Yiyuan Wu</i>	
Simulation-Based Study on Multiphase Flow: Investigating Phase Content Ratios and Measurement Techniques .....	295
<i>Meng Bai, Xiaoxin Wang, Huiqin Jia, Bo Wang</i>	
Energy Optimization for Commercial Vehicle Platoon with Optimal Sliding Mode Control.....	301
<i>Changyang Deng, Maode Yan, Lei Zuo, Yuncong Ma</i>	
GMMCP Based Multi Target Tracking Algorithm with Missing Measurements .....	307
<i>Kaiyi Jiang, Tianli Ma, Yaowen Hu</i>	
Neuroadaptive Fault-tolerant Control for Vehicle Platoons with Sensor Partial LoE Fault.....	311
<i>Xiaomin Liu, Maode Yan, Panpan Yang</i>	

Fault Diagnosis for Rolling Bearings Using Time-Frequency Energy Matrix difference and CNN.....	317
<i>Lin Li, Xiaoxi Yuan, Congkun Yang</i>	
Research on Adaptive Cruise Control Strategy Considering Driving Style.....	322
<i>Ruiyu Hou, Fei Hui, Ruimin Kuang, Ruining Yang</i>	
Research on Wavelet Threshold Denoising Method of Ultrasonic Echo Signal in Ultrasonic Drilling Fluid Leak Detection System .....	328
<i>Jia Huiqin, Shu Xinhua, Zhang Yijia</i>	
<b>6. Autonomous Driving System and Path control</b>	
Research on Hybrid Path Planning Algorithm for Mobile Robots Based on Complex Environment .....	334
<i>Chun Wang, Huagang Liang, Rui Kang, Boshuai Xu</i>	
Online Collaborative Obstacle Avoidance Path Planning Based on Multi-AUV .....	340
<i>Xiaoyu Ma, Wei Chen, Ruisheng Sun, Jiarong Cao</i>	
The Control System of High-Speed Sweeper Swing Arm Based on BP Neural Network PID .....	346
<i>Baozhou Xia, Chao Ju, Min Ye</i>	
The Influence of Projectile Structural Parameters on the Dynamic Characteristics within the Bore .....	351
<i>Diantao Zheng, Peng Wang, Ningchao Zhang, Tianli Ma</i>	
Research on 2D Laser SLAM Algorithm Fusion of Semantic Information.....	356
<i>Xianming Meng, Xianwu Gong, Kuiyao Li, Yong Shi, Yucheng Ma</i>	
Autonomous underwater vehicle geomagnetic perceiving navigation based on policy gradient.....	362
<i>Hong Li, HengYu Liu</i>	
Comprehensive Performance Evaluation of the Unmanned Bulldozer Based on Fuzzy Analytic Hierarchy Process .....	368
<i>Binrui Zhang, Lunming Huang, Min Ye</i>	
Research on the Application of Low-Cost Aerial-Ground Delivery System Using UAV-UGV Joint .....	373
<i>Hailong Qin, Xin Yan, Jianxin Li</i>	
Path Planning for Surface Unmanned Vehicle Based on Multi-constraint Modified Artificial Potential Field Method .....	379
<i>Xuchun Wu, Ping Deng, Peng Wang, Lin Li</i>	
Review of Steering Brake Control Strategy for Distributed Drive Electric Vehicle* .....	386
<i>Zhipeng Qiu, Xuan Zhao, Kang Xiangli</i>	
Multiscale and Multidirectional Gabor Filters for Image Corner Detection .....	396
<i>Huaqing Wang, Junfeng Jing, Ning Li, Weichuan Zhang</i>	
Deep Reinforcement Learning-Based Lane-Changing Trajectory Planning for Connected and Automated Vehicles .....	406
<i>Jianbei Liu, Yao Feng, Shoucai Jing, Fei Hui</i>	

Research on Coded Target Recognition Based on Improved YOLOv5.....	413
<i>Jialing Li, Hongli He, Xin Wang, Shuqi Wei</i>	

A Hybrid Optimization Algorithm for Automatic Parking Trajectory Planning in Complex Scenarios .....	420
<i>Ruimin Kuang, Fei Hui, Ruiyu Hou, Xin Jin</i>	

Trajectory Planning of Manipulator on Enhanced Sparrow Algorithm.....	426
<i>Xuesong Han, Guangyuan Zhao, Haodi Zhang</i>	

## 7. Image Detection and Algorithms

Hypersonic Vehicle Trajectory Prediction Algorithm Incorporating Multiple Attention and Coding-Decoding Structures.....	432
---	-----

*Zirui Ding, Jie Zhou, Chaobo Chen, Song Gao*

A power system meter detection method based on YOLO-MDM algorithm.....	438
<i>Li Xu, Feng Yu, Zhang Yongxiang</i>	

Improved Highway Vehicle Detection Algorithm for YOLOv8n .....	444
<i>Xiaoxiao Feng, Anhu Ren, Hua Qi</i>	

Comparative Analysis of Transfer Learning and Customized Deep Convolutional Neural Networks for Breast Cancer Detection and Classification .....	449
--	-----

*Md. Rakibul Islam, Md. Mahbubur Rahman, Md. Sipon Miah*

Pedestrian fall detection based on improved Spatial-Temporal Graph Convolutional Network.....	455
<i>Yuanqiang Lin, Hui Gao, Peng Wang, Zhigang Lv, Xiaoyan Li, Chu Wang</i>	

Dynamic Alignment Oriented Detector for Remote Sensing Object Detection .....	460
<i>Jie Yang, Li Zhou, Yong-Feng Ju</i>	

Tunnel fire source detection in improved Transformer neural network.....	467
<i>Quan Xu, Jian He, Xueguang Zhang, Xiaobo Xu, Huagang Liang, Chun Wang</i>	

The Radar Target Detection System Based on Chaotic Shape-forming Filter .....	473
<i>Xin Yang, Kun Tian, Chao Bai</i>	

Insulator defect detection method based on improved YOLOv7.....	478
<i>Yuhang Ren, Tao Zhang, Ruohu Ma, Haonan Zhang</i>	

## 8. Image Recognition and Detection

Point Interpolation Algorithm for Elliptical Cylindrical Ruled Surface in Stone Sawing Process .....	484
<i>Dehao Meng, Cong Geng, Han Zhang, Jinjie Wang, Weichong Ye</i>	

An Improved YOLOv5 Algorithm for Apple Object Recognition and Localization.....	489
<i>Lin Li, Wutian Duan, Chaobo Chen</i>	

Video-based Person Re-Identification Using Spatial-Temporal Memory Coupling Network .....	494
<i>Wenlong Liu</i>	

Application of improved ChOA-SVM in ship welding penetration state recognition.....	501
<i>You Zhengyang and Jiao Ziquan</i>	
A Novel Low-Energy and Low-Latency Clustering Method for Large-Scale Sensor Network .....	513
<i>Mingyue Zhang, Jianpeng Xie, Bo Jin, Yahui Chai, Yuqin Zeng, Jie Zhou</i>	
Research on construction machinery identification based on improved YOLOv5 .....	520
<i>Ying Li, LongFei Fu, DongShan Zhu, Hang Cheng</i>	
Computer-assisted Laser Treatment of Anorectal Pathology.....	527
<i>Dmitry Ivanov, Yury Kolbas, Evgenii Kuznetsov, Tatiana Soloveva</i>	
Open Circuit Fault Diagnosis and Fault Tolerance Control of PMSM Inverter Based on High Frequency Injection .....	532
<i>Jingyi Zhou, Liyan Zhang, Qihong Chen</i>	
Energy Consumption Prediction of Electric Vehicles Based on Driving Behavior Identification.....	542
<i>Zhuo Xi, Xianwu Gong, Rui Wang, Kang Xiangli, Meng Li, Yucheng Ma</i>	

## **9. Machine Vision and Image Processing**

Enhancing Common Loss Functions: "Append" with Overall Metrics as Supplementary.....	548
<i>Zhuo-Ran Chen, Kun Tian, Xiao-Yan Zhang, Su-Ping Zhao</i>	
HF-DehazeNet: Hybrid Features-Based Network for Image Dehazing.....	554
<i>Ruofan Li, Bobin Yao, Yanbo Li, Qisheng Wu</i>	
YOLOv5 Water Surface Garbage Detection Algorithm Based on Deep Separable Convolution.....	559
<i>Xuchun Wu, Ping Deng, Peng Wang, Tianli Ma</i>	
Image correction for perspective projection distortion of cylindrical surface based on point cloud .....	565
<i>Fabo Qiu, Gaoli Cheng, Xiaohua Xia, Xiaojuan Li, Jian Chen, Yaoyao Wang</i>	
Measurement of Projectile Position by Intersection of Area Array CCD.....	570
<i>Xiaoguang Liu, Zhiyong Lei</i>	
Way-points Coverage Control and Simulation of Orchard Vehicle for Orchard Area.....	576
<i>Mingjie Shen, huipeng Qiu, Jiacheng Song, Zuojing Zhang</i>	

## **10. Intelligent Control System Design and System Function Analysis**

Physics-Informed Machine Learning Based Permanent Magnet Synchronous Motor Temperature Estimation .....	582
<i>Pengyuan Wang, Xinjian Wang, Yunpeng Wang</i>	
Numerical Simulation and Optimization of Condensation and Heat Transfer Characteristics on the Air-Side of Fin-and-Tube Heat Exchangers .....	588
<i>Zhu Zheng, Yunfei Chen, Hao Chen</i>	

Optimal Design of Adaptive Landing Gear Based on TRIZ Theory .....	595
<i>Jinfan Fu, Qianjun Hang, Yang Zhou, Yahui Wang, Yichen Chu, Cuilan Zhu</i>	
Design of automatic climbing wheelchair for the elderly based on TRIZ theory .....	600
<i>Yahui Wang, Yichen Chu, Yunan Zhong, Yang Zho, Mingzheng Bao, Cuilan Zhu</i>	
.....	Author Index