

2023 3rd International Conference on Robotics, Automation and Intelligent Control (ICRAIC 2023)

**Zhangjiajie, China
22-24 December 2023**



**IEEE Catalog Number: CFP23VA1-POD
ISBN: 979-8-3503-6082-0**

**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:	CFP23VA1-POD
ISBN (Print-On-Demand):	979-8-3503-6082-0
ISBN (Online):	979-8-3503-6081-3

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
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2023 3rd International Conference on Robotics, Automation and Intelligent Control (ICRAIC) **ICRAIC 2023**

Table of Contents

Preface	xvi
Conference Committee	xvii

ICRAIC 2023

Development of Ballast Water Control Simulation System for Solid Bulk Carriers	1
<i>Derun Yang (Dalian Maritime University, China) and Baijun Tian (Dalian Maritime University, China)</i>	
An Unknown Risk Analysis and Evaluation Method for Distribution Edge Computing Networks	8
<i>Hua Ni (Shanghai Academy of Artificial Intelligence Industrial Technology, China), Yifu Lin (State Grid Fujian Electric Power Co., Ltd, China), and Xue Chen (State Grid Fujian Electric Power Co., Ltd.; State Grid Fujian Economic Research Institute, China)</i>	
Analysis and Research on Technical Characteristics of Balance Type Twin-Screw Compressor Based on Advantage Structure	14
<i>Ling Deng (Wuhan Railway Vocational College of Technology, China) and Liwu Zhang (Wuhan Railway Vocational College of Technology, China)</i>	
Metal Surface Feature Fusion for Defect Recognition	19
<i>Wenkai Lyu (Zhejiang Normal University, China) and Chengzhuan Yang (Zhejiang Normal University, China)</i>	
Source-Based Disjoint Multi-Path Routing Protocol for Underwater Acoustic Networks	24
<i>Tingwei Lou (Zhejiang University, China), Shaojian Yang (Zhejiang University, China), Yu Yuan (Zhejiang University, China), Xiaoxiao Zhuo (Chinese Academy of Sciences, China), Yufan Yuan (Zhejiang University, China), Yan Wei (Zhejiang University; Ministry of Education, China), Xingbin Tu (Zhejiang University; Ministry of Education, China), and Fengzhong Qu (Zhejiang University; Ministry of Education, China)</i>	
Which Performs Better, Linear Scanning or the KNN Searching Algorithm Based on 2D Grids?	30
<i>Tong Ji (Jinan University, China), Yifeng Lin (Jinan University, China), Yuer Yang (The University of Hong Kong, China), and Hui Liu (University of Chinese Academy of Sciences, China)</i>	

Remote Sensing on a Bird-Inspired Flapping Wings Robot Combined with LiDAR	36
<i>Lican Wu (Tsinghua University, China), Yaqi Han (Tsinghua University, China), Qingyang Zhu (Tsinghua University, China), Yi Hao (Tsinghua University, China), Ziming Ye (Tsinghua University, China), Ruqi Huang (Tsinghua University, China), Yu Cai (Guangxi University, China), and H. Y. Fu (Tsinghua University, China)</i>	
Disturbance Observer-Based H_{∞} Control for Flexible Spacecraft Systems Under Deception Attacks	40
<i>Boming Chen (Faculty of Information Technology Beijing Laboratory of Smart Environmental Protection Beijing Institute of Artificial Intelligence Beijing University of Technology, China) and Zipeng Wang (Faculty of Information Technology Beijing Laboratory of Smart Environmental Protection Beijing Institute of Artificial Intelligence Beijing University of Technology, China)</i>	
Fault-Tolerant Control for Delayed PDE-ODE Coupled Systems	46
<i>Xi-Dong Shi (University of Jinan, China), Zi-Peng Wang (Beijing University of Technology, China), Xue-Hua Yan (University of Jinan, China), and Xiao-Wei Zhang (Tiangong University, China)</i>	
Airborne Test Switching Network Status Automatic Monitoring Technology	51
<i>Ruizhen Song (Chinese Flight Test Establishment, China) and Xiaohong Yang (Xi'an Zhongfei Aviation Testing Technology Development Co., Ltd, China)</i>	
A Lightweight Bilateral Semantic Segmentation Network for Robots	56
<i>Yihan Huang (Nanjing Normal University, China), Yao Lu (Nanjing Normal University, China), Zhilin Gao (Nanjing Normal University, China), Fei Xie (Nanjing Normal University, China), Lei Ma (Nanjing 30000iot Technology Co., Ltd, China), and Jianjun Shi (Nanjing Zhongke Raycham Laser Technology Co., Ltd, China)</i>	
Multi-Objective Defect Detection of Substation Equipment Based on SA-YOLOv7 Algorithm	61
<i>Yu Yang (Hubei Minzu University, China), Lin Gao (Hubei Minzu University, China), Zhi Wang (Hubei Minzu University, China), and Yunyun Zhu (Hubei Minzu University, China)</i>	
A Cross-Layer Security Analysis and Synthesis Method of B5G Base Station in Industrial Internet	67
<i>Sheng Hong (Beihang University, China), Yuchen Xiao (Beihang University, China), and Xiaohu Chen (China Tobacco Hubei Industry Co., Ltd, China)</i>	
Online Fine-Tuning Method for Power Grid Artificial Intelligence Model Based on Cloud-Edge Collaboration	72
<i>Zexu Du (State Grid Smart Grid Research Institute Co.ltd., China), Guoliang Zhang (State Grid Smart Grid Research Institute Co.ltd., China), Yi Zhang (State Grid Smart Grid Research Institute Co.ltd., China), Wei Wei (State Grid Smart Grid Research Institute Co.ltd., China), and Zongbo Chu (State Grid Smart Grid Research Institute Co.ltd., China)</i>	

A Simple and Efficient Point Cloud Sampling Strategy Based on Cluster Merging	77
<i>Zhuhua Bai (Dalian University of Technology, China), Weiqing Li (Dalian University of Technology, China), Guolin Yang (Dalian University of Technology, China), Fantong Meng (Dalian University of Technology, China), Renke Kang (Dalian University of Technology, China), and Zhigang Dong (Dalian University of Technology, China)</i>	
Image Defogging Algorithm Based on Semi-Supervised Learning Neural Network	86
<i>Zhilin Gao (Nanjing Normal University, China), Fei Xie (Nanjing Normal University, China), Yue Yin (Nanjing Normal University, China), Xuan Chen (Nanjing Normal University, China), Jun Wang (Nanjing 30000iot Technology Co., Ltd., China), and Jianjun Shi (Nanjing Zhongke Raycham Laser Technology Co., Ltd, China)</i>	
An AMR Mapping Method Based on High Efficiency Recursive Filtering Fusion Algorithm	90
<i>Xudong Liu (Beijing University of Technology, China), Junfei Lu (Beijing University of Technology, China), Yuanze Gui (Beijing University of Technology, China), and Yi Yang (Beijing University of Technology, China)</i>	
OOD-ENS: Cross-Validated Out-of-Distribution Ensemble Detector	95
<i>Zhengjiang Liu (Shanxi University, China), Wen Zhang (Shanxi University, China), and Ruibo Wang (Shanxi University, China)</i>	
Co-Designing Body and Behavior via Planning-Based Hierarchical Grammatical Evolution	102
<i>Xinglin Chen (National University of Defense Technology, China), Da Huang (National University of Defense Technology, China), Minglong Li (National University of Defense Technology, China), Yishuai Cai (National University of Defense Technology, China), Zhongxuan Cai (National University of Defense Technology, China), and Wenjing Yang (National University of Defense Technology, China)</i>	
Variable Scale Gesture Recognition: A Dataset and Comprehensive Analysis	110
<i>Zhaoyu Li (University of Jinan, China), Tao Xu (University of Jinan, China), Xiaohui Yang (University of Jinan, China), Jiahui Sun (University of Jinan, China), and Guangze Zhu (University of Jinan, China)</i>	
The Buried Target Detection System Based on Unmanned Underwater Vehicle: Signal Processing Methods for Parametric Ricker Wave	115
<i>Hanyun Zhou (Zhejiang University of Technology, China) and Wei Li (Hangzhou City University, China)</i>	
Defect Detection of Photovoltaic Panel Electroluminescence Image Based on YOLOv7-SE-DS-NWD Algorithm	121
<i>Xiaoyu Zhao (Hubei Minzu University, China), Lin Gao (Hubei Minzu University, China), Yunmeng Peng (Hubei Minzu University, China), and Xiaoli Yang (Hubei Minzu University, China)</i>	

Using Technical Standards to Reason, Detect, Simulate and Control Distributed New Energy Grid Connections	126
<i>Zhen Qiu (State Grid Information & Telecommunication Group Co, Ltd, China), Xi Chen (Beijing SGITG Accenture Information & Technology Center Co., Ltd., China), Changshun Fei (Beijing SGITG Accenture Information & Technology Center Co., Ltd., China), Fan Xu (State Grid Information & Telecommunication Group Co, Ltd, China), Ronghu Cao (Beijing SGITG Accenture Information & Technology Center Co., Ltd., China), Wenpu Li (State Grid Information & Telecommunication Group Co, Ltd, China), Jianyu Zhao (Beijing SGITG Accenture Information & Technology Center Co., Ltd., China), and Aijun Ren (Beijing SGITG Accenture Information & Technology Center Co., Ltd., China)</i>	
A Bullet Hole Recognition Method Based on Visual Detection	133
<i>Fengjie Yu (Shandong University of Science and Technology, China), Shibin Song (Shandong University of Science and Technology, China), Jie Zhu (Shandong University of Science and Technology, China), Weihao Cheng (Shandong University of Science and Technology, China), Wenshuo Wu (Shandong University of Science and Technology, China), Luwen Zhang (Shandong University of Science and Technology, China), and Xiaojie Jiang (Yantai Tulan Electronic Technology Co., Ltd, China)</i>	
Automotive OTA Upgrade Scheme Based on Optimal Difference Algorithm	140
<i>Guihe Qin (Changsha Automobile Innovation Research Institute, China; Jilin University, China), Yingbei Wang (Jilin University, China), Yanhua Liang (Jilin University, China), and Jiaru Song (Jilin University, China)</i>	
An Enhanced ALNS Algorithm Integrated with DQN for Resource Allocation in Space Station Experiment Operations	145
<i>Qianlong Wang (University of Chinese Academy of Sciences, China), Peng Wu (Chinese Academy of Sciences, China), and Lili Guo (Chinese Academy of Sciences, China)</i>	
Exploring the Path of Human-Robot Collaboration Decision Making on Team Performance Driven by Digital Technology	151
<i>Fangfang Zhao (Henan Polytechnic University, China), Shiyong Shi (Henan Polytechnic University, China), Chenyu Zhang (Henan College of Surveying and Mapping, China), and Han Zhang (Henan Polytechnic University, China)</i>	

Application and Algorithm Research of Proportional Directional Valve in Speed Control	
Circuit of Underwater Hydraulic Motor	156
<i>Jun Han (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China), Xiufeng Li (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China), Zhida Chen (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China), Hao Liu (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China), Hongtao Ji (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China), Qingyong Zhang (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China), and Fei Xie (China Ship Scientific Research Center, Taihu Laboratory of Deepsea Technological Science, State Key Laboratory of Deep-sea Manned Vehicles, China)</i>	
Research of Robot-Assisted Puncture Navigation Based on 3D Reconstruction Images	162
<i>Jianying Tian (Shandong Institute of Commerce and Technology, China)</i>	
System-Level Calibration for NMRG Inertial Navigation System Considering the Influence of Magnetic Field	167
<i>Qixin Lou (National University of Defense Technology, China), Xudong Yu (National University of Defense Technology, China), Ding Li (National University of Defense Technology, China), Yi Zhang (National University of Defense Technology, China), Qiyuan Jiang (National University of Defense Technology, China), and Bingfeng Sun (National University of Defense Technology, China)</i>	
A Congestion Sub-Area Coordinated Control Model for Queue Suppression Based on Improved Evolutionary Algorithm	172
<i>Yanfang Shou (South China University of Technology, China), Hongjie Li (Poly Changda Engineering Co., Ltd., China), and Jianmin Xu (South China University of Technology, China)</i>	
Research on Underwater Target Detection Technology Based on Deep Learning	178
<i>Hui Zhou (Tongji University, China), Xinru Wang (Tongji University, China), Rong Chen (Tongji University, China), Weiheng Lu (Tongji University, China), Liyan Cheng (Tongji University, China), Qinghe Su (Tongji University, China), Ruizhi Wang (Tongji University, China), Qunhui Yang (Tongji University, China), and Meiwei Kong (Tongji University, China)</i>	
Optimal Capacity Allocation of Battery Energy Storage Systems for Rural Distribution Grids Based on Improved Multi-Objective Whale Algorithm	183
<i>Xiaofei Du (Hubei Minzu University, China) and Qing Ai (Hubei Minzu University, China)</i>	
An RF Synthesis Method for the UAV Radar	189
<i>Shangguang Liu (Nanjing Research Institute of Electronics Technology, China) and Yuanhang Dong (Nanjing Research Institute of Electronics Technology, China)</i>	

Three-Dimensional SAR Target Reconstruction Based on pix2pix and Pixel2mesh	197
<i>Liang Li (Jiangxi University of Science and Technology, China), Lingjuan Yu (Jiangxi University of Science and Technology, China), Jianping Zou (Jiangxi University of Science and Technology, China), Miaomiao Liang (Jiangxi University of Science and Technology, China), Xiangchun Yu (Jiangxi University of Science and Technology, China), and Xiaochun Xie (Gannan Normal University, China)</i>	
Design and Realisation of a Construction Robot Applied to Concrete Vibration for Box Girders	202
<i>Shuai Fan (Chengdu University of Technology, China), Tao He (Chengdu University of Technology, China), Xiangxiang You (Chengdu University of Technology, China), Chuang Zeng (Sichuan Road & Bridge Group Co., Ltd., China), Ye Liang (Chengdu University of Technology, China), and Chao Li (Chengdu University of Technology, China)</i>	
Arduino-Based Omnidirectional Mobile Intelligent Vehicle Control System	208
<i>Dandan Zhang (Yanbian University, China), Yinan Xu (Yanbian University, China), Hao Li (Yanbian University, China), and Yujing Wu (Yanbian University, China)</i>	
Vision-Based Mobile Robotic Grinding Path Generation for Large Castings	213
<i>Lufeng Chen (School of Automation Engineering UESTC, China), Aobo Chen (School of Automation Engineering UESTC, China), Yiqun Kuang (School of Automation Engineering UESTC, China), Shuai Fan (Chengdu University of Technology, China), and Jing Qiu (School of Mechanical and Electrical Engineering, UESTC, China)</i>	
Multi-Obje Optimization Strategy for Distributed Energy Resources in Distribution Networks Based on a Two-Stage Model	218
<i>Zhichao Wang (Hubei Minzu University, China), Xianbo Sun (Hubei Minzu University, China), and Yiluo Ke (Hubei Minzu University, China)</i>	
Dynamic Reactive Power Optimization Strategies for Active Distribution Networks	225
<i>Yiluo Ke (Hubei Minzu University, China), Xianbo Sun (Hubei Minzu University, China), and Zhichao Wang (Hubei Minzu University, China)</i>	
Research on Size Detection Algorithm of Remote Transmission Cable Based on Instance Segmentation	232
<i>Jiahao Fan (Xi'an Technological University, China), Junwei Tian (Xi'an Technological University, China), Yuhan Bu (Xi'an Jiaotong-Liverpool University, China), Jie Zhang (Equipment Research Institute Design Room 1 Inner Mongolia North Heavy Industry Group Co. LTD, China), and Zhen Zhang (Xi'an Technological University, China)</i>	
Design and Implementation of an Autonomous Control System for Simulated Fixed-Wing Unmanned Aerial Vehicles	240
<i>Xiaofeng Chen (The 52nd Research Institute of China Electronics Technology Group Corporation, China), Yongjin Zhang (The 52nd Research Institute of China Electronics Technology Group Corporation, China), Chongxiao Qu (The 52nd Research Institute of China Electronics Technology Group Corporation, China), Changjun Fan (The 52nd Research Institute of China Electronics Technology Group Corporation, China), Tingting Wang (The 52nd Research Institute of China Electronics Technology Group Corporation, China), and Shuo Liu (The 52nd Research Institute of China Electronics Technology Group Corporation, China)</i>	

VREP Platform: A Virtual Reality-Based Human-Computer Interaction Experimental Platform	246
<i>Bozhi Tan (Nanjing Audit University, China), Shikai Liu (Nanjing Audit University, China), Yuqi He (Nanjing Audit University, China), and Yi Zhu (Nanjing Audit University, China)</i>	
Design and Trial Production of Flying Flowers Detection and Information Processing Device Basis on Line Scan Camera	250
<i>Yuefei Wang (Nantong Cellulose Fibers Co, Ltd, China), Kai Yu (Jiangsu University, China), Youyin Si (Nantong Cellulose Fibers Co, Ltd, China), Kaiwen Duan (Jiangsu University, China), Ziyang Jiang (Nantong Cellulose Fibers Co, Ltd, China), Haibing Gu (Nantong Cellulose Fibers Co, Ltd, China), Zhanping Yang (Nantong Cellulose Fibers Co, Ltd, China), and Lin Shen (Nantong Cellulose Fibers Co, Ltd, China)</i>	
Preprocessing and Classification of SERS Spectra Using SA-CNN	255
<i>Xin Wang (Xiamen University, China), ZiQuan Liu (Xiamen University, China), XianGuang Fan (Xiamen University, China), and Jian He (Xiamen University, China)</i>	
Platoon Stability for Cooperative Adaptive Cruise Control Systems with Communication Delay	260
<i>Chunshun Duan (University of Jinan, China), Weiwei Yu (Shandong Big Data Center, China), Shiyuan Han (University of Jinan, China), and Yuling Fan (University of Jinan, China)</i>	
An Improved Robust ClusterGAN with the Perturbation Attack	265
<i>Chunshun Duan (University of Jinan, China), Jiaqi Li (University of Jinan, China), Jie Liu (University of Jinan, Quancheng Laboratory, China), Jin Zhou (University of Jinan, Quancheng Laboratory, China), Yingxu Wang (University of Jinan, China), Tao Du (University of Jinan, China), Cheng Yang (University of Jinan, Quancheng Laboratory, China), and Bowen Liu (University of Jinan, Quancheng Laboratory, China)</i>	
A Long-Distance Small Target Perception Optimization Algorithm Integrating SRGAN and YOLO	271
<i>Shuchen Liu (Shandong Institute of Commerce and Technology, China), Ningning Ren (Shandong Institute of Commerce and Technology, China), and Lianqin Jia (Shandong Institute of Commerce and Technology, China)</i>	
Rotary Fourier Transform Infrared Spectrometer Measurement System	275
<i>Xianguang Fan (Xiamen University, China), Tao Yang (Xiamen University, China), Jiansheng Chen (Xiamen University, China), and Xin Wang (Xiamen University, China)</i>	
Transmissive Phase Measuring Deflectometry System using Frequency Domain Gamma Error Elimination Algorithm	280
<i>Xianguang Fan (Xiamen University, China), Yixin Yang (Xiamen University, China), Xin Wang (Xiamen University, China), and Yingjie Xu (Xiamen University, China)</i>	
Improvement of Mobility Spectrum Algorithm Based on Hall Measurement	285
<i>Xin Wang (Xiamen University, China), Ruiqiang Zhou (Xiamen University, China), Ning Yu (Xiamen University, China), and Jian He (Xiamen University, China)</i>	

STM Topography Image Noise Modeling and Blind Denoising Based on Deep Learning	290
<i>Xianguang Fan (Xiamen University, China), Hanqing Pan (Xiamen University, China), Yuchen Huang (Xiamen University, China), Yingjie Xu (Xiamen University, China), and Xin Wang (Xiamen University, China)</i>	
Model Optimization Methods for Real-Time 2D Human Pose Estimation Applied to Robots: A Survey	295
<i>Weiting He (Neusoft Institute Guangdong, China), Bi Zeng (Guangdong University of Technology, China), Jianqi Liu (Guangdong University of Technology, China), Xiaoying Ye (Neusoft Institute Guangdong, China), and Fuken Zhou (Neusoft Institute Guangdong, China)</i>	
Design of Robotic Workstation for Laser Welding of Pressure Vessels	311
<i>Wenjun Gui (Anhui University of Technology, China), Liangan Zhang (Anhui University of Technology, China), Xiangrong Xu (Anhui University of Technology, China), Jianwei Fan (Anhui University of Technology, China), and Weiming Zhong (Anhui University of Technology, China)</i>	
Implementation of a High-Precision Secondary Radar Tracking Algorithm Based on Single-Pulse Tracking Technology	319
<i>Guanglu Zhou (The 20th Research Institute of China Electronics Technology Group Corporation, China), Xibing Yang (The 20th Research Institute of China Electronics Technology Group Corporation, China), Wei Wu (The 20th Research Institute of China Electronics Technology Group Corporation, China), and Xiaowei Guo (The 20th Research Institute of China Electronics Technology Group Corporation, China)</i>	
Dynamic-Memory Event-Triggered Control Approach and Its Application to Linear Systems	325
<i>Jin Yang (University of Electronic Science and Technology of China, China), Xian Zhou (University of Electronic Science and Technology of China, China), Shihao Wang (University of Electronic Science and Technology of China, China), Qishui Zhong (University of Electronic Science and Technology of China, China), Kaibo Shi (Chengdu University, China), and Lanfeng Hua (University of Electronic Science and Technology of China, China)</i>	
Fatigue Life Analysis of the Grabber Working Device Under the Compound Action	332
<i>Chao Li (Chengdu University of Technology, China; Sichuan Bonny Heavy Machinery Co., LTD., China), Zuozhou Xie (Chengdu University of Technology, China), Yu Cai (Sichuan Bonny Heavy Machinery Co., LTD., China), Xu Cheng (Chengdu University of Technology, China), Chunjian Zhong (Sichuan Bonny Heavy Machinery Co., LTD., China), Hao Gao (Chengdu University of Technology, China), and Wenmeng Zhou (Chengdu University of Technology, China)</i>	
Extended State Observer and Kalman Filter Based Control for DC-DC Buck Converter Subject to Disturbances and Noise	338
<i>Rui You (Tiangong University, China), Yunjun Chen (Tiangong University, China), and Lu Zhang (Tiangong University, China)</i>	

Complex Fault Diagnosis of Rolling Bearings Based on Improved Residual Shrinkage Networks ...	344
<i>Kai Wang (Chengdu University of Technology, China), Yiming Gou (Chengdu University of Technology, China), Zhengzhi Chen (Chengdu University of Technology, China), Jiuliang Wang (Chengdu University of Technology, China), and Yu Deng (Chengdu University of Technology, China)</i>	
Design of Segmented Boost Constant Voltage Battery Charger Based on Leakage Transformer	350
<i>Xiangjin Yin (Hubei Minzu University, China), Shidong Li (Hubei Minzu University, China), Qinyi Liao (Hubei Minzu University, China), and Qiaoqiao Xing (Hubei Minzu University, China)</i>	
Research on Sound Source Localization and Path Planning with SLAM Maps	356
<i>Dong Wang (Liaoning University, China), Juxian Wu (Liaoning University, China), Lina Li (Liaoning University, China), and Panfeng Xu (Liaoning University, China)</i>	
Research on Fire Protection System Based on Deep Learning	362
<i>Tiannian Zhou (State Grid Hunan Electric Company Limited, China), Ping Liang (State Grid Hunan Electric Company Limited, China), Zhi Zhang (Xidian University, China), Zhiyong Dai (Xidian University, China), Guangqi Li (Xidian University, China), and Hongyuan Guo (Xidian University, China)</i>	
FCNN-GraspNet: A Steamlined Neural Network for Robotic Grasp Detection	368
<i>Caiyu Xiong (Southwest University of Science and Technology, China), Hongyu Chu (Southwest University of Science and Technology, China), Xiaoqiang Zhang (Southwest University of Science and Technology, China), Huichao Shao (Ledor Spatial Information Technology Co., Ltd, China), and Lijiao Lin (Southwest University of Science and Technology, China)</i>	
Parameter Design and Simulation Verification of Leg Hydraulic Cylinder for Quadruped Robot....	373
<i>Jiong Wang (Robotics Engineering Center, The 21st Research Institute of China Electronics Technology Group Corporation, China), Ke Su (Robotics Engineering Center, The 21st Research Institute of China Electronics Technology Group Corporation, China), Rui Wang (Qiyuan lab, China), and Xunwei Wu (Robotics Engineering Center, The 21st Research Institute of China Electronics Technology Group Corporation, China)</i>	
A Hybrid CNN and Transformer Model for Chest X-Ray Classification: Toward Accurately Diagnosing COVID-19	377
<i>Xiaoqiang Shi (University of Shanghai for Science and Technology, China), Kun Liu (University of Shanghai for Science and Technology, China), Keyi Su (School of Medicine and Pharmacy China Stata Institute of Pharmaceutical Industry Shanghai, China), and Gang Huang (Shanghai University of Medicine and Health Sciences, China)</i>	
Path Planning for Mobile Robots Based on Improved A* Algorithm	382
<i>Weijing Wang (Anhui University of Technology, China), Xiangrong Xu (Anhui University of Technology, China), Haining Miao (Anhui University of Technology, China), Petar B. Petrovic (University of Belgrade, Serbia), Aleksandar Rodic (University of Belgrade, Serbia), and Zhixiong Wang (Osaka University, Japan)</i>	

Optimized Object-Aided SLAM for Robots Based on Shufflenetv3 and Relocalization	388
<i>Qinyang Liu (Nanjing Normal University, China), Zhaoting Wu (Nanjing Normal University, China), Zhiyu Lu (Nanjing Normal University, China), Ruyue Jiang (Nanjing Normal University, China), Fei Xie (Nanjing Normal University, China), and Jing Zhao (Nanjing University of Posts and Telecommunications, China)</i>	
Deep Learning Based Approach for Human-Like Driving Trajectory Planning	393
<i>Feifei Zhai (Jilin University, China), Hao Xu (Jilin University, China), Chen Chen (Jilin University, China), and Guanyu Zhang (Jilin University, China)</i>	
Performance Evaluation of OFDM with Multi-Mode Index Modulation in Bandlimited Low-Pass VLC Systems	399
<i>Faheem Ahmed (Chongqing University, China), Jiamin Chen (Chongqing University, China), Svetislav Savović (University of Kragujevac, Serbia), and Chen Chen (Chongqing University, China)</i>	
HexHeAd: 6D Head Pose Estimation Based Visual Focus of Attention Detection	404
<i>Zhitao Wan (University of Nottingham Ningbo China and Ningbo Free Trade Zone Blockchain Laboratory, China), Haoze Fei (University of Nottingham Ningbo China and Ningbo Free Trade Zone Blockchain Laboratory, China), Yuanwei Xu (University of Nottingham Ningbo China and Ningbo Free Trade Zone Blockchain Laboratory, China), Shenjia Yang (University of Nottingham Ningbo China and Ningbo Free Trade Zone Blockchain Laboratory, China), Miao Yang (University of Nottingham Ningbo China, China), and Xiuping Hua (University of Nottingham Ningbo China Ningbo, China)</i>	
Small Target Detection in Aerial Photography Based on Improved YOLOv5	409
<i>Zenghui Guo (Tiangong University, China) and Lijin Guo (Tiangong University, China)</i>	
A Study of Obstacle Avoidance Problem for Robots Based on Basic Line-Circle Combinations	414
<i>Jiawen Kang (Northeastern University, China)</i>	
Design of a Multi-Mode Intelligent Drive Stroke Rehabilitation Robot Based on Limb Linkage Structure	420
<i>Yusi Cheng (Nanjing University of Science and Technology, China), Chen Zhu (Nanjing University of Science and Technology, China), Jiajun Xu (Nanjing University of Aeronautics and Astronautics, China), Yu Gao (Nanjing Medical University, China), Yingying Ji (Wuxi Central Rehabilitation Hospital, The Affiliated Mental Health Center of Jiangnan University, China), Longfei Yang (Nanjing University of Science and Technology, China), and Yumo Wang (Nanjing University of Science and Technology, China)</i>	
Research on Obstacle Avoidance Algorithm of Self-Driving Bus Based on Driving Risk Assessment	429
<i>Yulong Li (Tianjin University, China) and Hui Xie (Tianjin University, China)</i>	
Improved TF-LSTM Multi-Step Vehicle Speed Prediction Model Based on LSTM and Attention Mechanism	436
<i>Hui Xie (Tianjin University, China) and Pengyu Liang (Tianjin University, China)</i>	

Author Index..... **441**