2022 IEEE 5th International Conference on Electronics Technology (ICET 2022)

Chengdu, China
13-16 May 2022

Pages 1-669

IEEE Catalog Number: CFP22P18-POD
ISBN: 978-1-6654-8509-8

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:	CFP22P18-POD
ISBN (Print-On-Demand):	978-1-6654-8509-8
ISBN (Online):	978-1-6654-8508-1
ISSN:	2768-6493

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

Table of Contents

2022 IEEE 5th International Conference on Electronics Technology (ICET)

Preface ..... **xviii**

Committees ..... **xix**

➢ **Electronic Materials and Manufacturing Processes**

A mmWave Metasurface Lens for Low Profile and High Transmittance 1
Kaihong Zheng, Yong Luo

Flexible Mechanical Sensor Based on Epitaxial $BaTiO_3$ Films with Biaxial Anisotropy 6
Tianyao Zhang, Guang Yao, Qian Wang, Maowen Xie, Yuan Lin

Investigation on Improving Color Crosstalk for High-Transmittance TFT-LCDs 10
Jinming Liu, Juncheng Xiao, Shengdong Zhang, Yoonsung Um, Yingchun Zhao, Xiaojin He, Bin Zhao

Novel Analog Designs with Back-Gate Bias by Using Global Foundries 22FDX® Technology 15
Don Blackwell, Xuemei Hui, Yajie Wang, Huijie Duan, Peter Hang, Van Ton-That, Ahmed Ginawi, Ali Wehbi

A Novel Punch through Breakdown Trench MOS with Self-Adjustable Resistor for Low Temperature Coefficient of Breakdown Voltage 20
Tongyang Wang, Zehong Li, Lingxuan Huang, Xiaohan Liu

Effect of Air Damping on the Vibration Characteristics of Hemispherical Fused Silica Resonators 24
Jianning Chu, Xin Liu, Changlin Liu, Jianguo Zhang, Xiao Chen, Jianfeng Xu

High-Efficiency Ink-Jet Printed OLED with Printable Electron Transport Layer 29
Xuebin Chen, Ting Shi, Shengdong Zhang, Ming Liu

An Electronic Design for a Multi-channel Digital Positron Annihilation Spectrometer Based on Multiplexing Technology 33
Gu Libo, Liang Hao, Ge Jiajin

Electrospun Titanium Dioxide Nanofibers Reinforced Anti-freezing, Adhesive and Conductive Hydrogels 38
Changfa Huang, Xiuru Xu, Yuxuan Chen, Zhengchun Peng

A Novel High Voltage Low Loss Planar Gate IGBT with Improved p-body Region 43
Jinping Zhang, Rongrong Zhu, Xiaofeng Li, Yifei Lan, Zehong Li, Bo Zhang

Ultra-Low On-Resistance TG-LDMOS With Three Separated Gates and High-k Dielectric Comparable to DG-LDMOS ... 48
Chen Jia, Xianglong Li, Yabin Sun, Xiaojin Li, Yun Liu, Yanfang Ding, and Yanling Shi

Research on the Shielding Effectiveness Analytical Algorithm of Enclosures with a Single Slanted Elliptical Aperture 52
Han Zhang, Changxian Li, Pin Wen

Absorption Modulation, Enhancement, and Narrowing Using Sub-Wavelength Gratings 58
Chenxi Liu, Haodong Tang, Haochen Liu, Xiao Wei Sun, Dan Wu, Kai Wang

➢ **Modern Integrated Module and Packaging Technology**

A Superior Encapsulation Strategy for Large-Sized Flexible Top-Emission OLEDs 64
Qingwu Yin, Jinchuan Li, Jiajia Qian, Zongpeng Yang, Weiran Cao, Shengdong Zhang

A DC-10GHz SPDT RF Switch with Bulk Self-Biasing Technique in 0.25μm BiCMOS Process 68
Qi Xiao, Haigang Feng, Xinpeng Xing, Zhihua Wang

The Influence of Properties of Solder Joint on the Stress of Underfill in Flip Chip Package 72
Chenglong Li, Cheng Zhong, Ruoyu Jiang, Yulong Li, Mingxiang Chen, Jibao Lu, Rong Sun

1-bit Reconfigurable Metasurface Unit Based on Resonant Coupling 79
Chunan Wang, Bing Li, Shiqi Liu, Zhiyuan Zhang, Deshuang Zhao

Mold Flow Simulation Analysis of Molded Underfill in an Ultra-thin High-Density Package 84
Yulong Li, Cheng Zhong, Chenglong Li, Ruoyu Jiang, Jibao Lu, Rong Sun

An Efficient Variation-tolerant Method for RRAM-based Neural Network 90
Chenglong Huang, Nuo Xu, Junjun Wang, Liang Fang

Study on Abnormal Gate Structures of GaN HEMT Devices 96
Zhenglian Chen, Guojian Shao, Tao Chen, Bin Ren, Changmei Zhang, Jun Sun

Design of a Power Sensor with Low Reflection in WR10 100
Zhaoling Chen, Chunyue Cheng, Na Zhang, Liying Feng

➢ **Electronic Device Design and Modeling**

A Double gm Stages Up-Conversion CMOS Mixer for Ka-Band Applications 105
Tong Lingyun, Zhao Minghua

Design of 8 GHz Dielectric Resonator Oscillator with Different Structure 109
Shaoshuai Hou, Yitong Jin, Zhiwen Qin, Qianrui Shen, Xiyu Zhu, Guangli Yang

Resistive Switching in Sputtered ZnO/IGZO Heterostructure Memristor 113
Xiongfeng Wang, Wugang Liao, Tingke Rao, Yuanliang Zhou, Yuankang Chen, Yudong Pang, Xiaopei Chen, Guocheng Bao

The Study of Bit Line to Storage Node Contact Leakage in Advanced DRAM 118
Yexiao Yu, Zhongming Liu, Jingsi Cui, Zhong Kong, Guobao Xiong, Hong Ma

A Simulation Method of Metasurface Lens Based on the Impedance Boundary 123
Qing Xiong, Shiwan Zhang, Yuanliang Ni, Yong Luo

Remote Calibration of Digital Input Electricity Meters 128
Wu Xia, Xiankun Qin, Wenxing Lu, Junhua Liang, Junyan Ou

Design Method of High Precision Buck-Boost Converter Based on Dynamically Trimming Error Amplifier 133
Hu Lu, Zhongjie Guo, Jiale Yang, Nan Liu

An Adaptive Stacked Radio-Frequency SOI Power Amplifier for Radiation-Hardened Applications 138
Xuan Duan, Tingting Han, Mi Tian, Zhijian Li, Weiqiang Zhu, Qian Xie, Zheng Wang

Class-AB Operational Amplifier with Current Domain Slew-Rate Enhancement 142
Ming Zhang, Xin'an Wang, Huanshuang Liu, Xingyu Qi, Xiaofei Li, Sai Wang

A 13-Bit High Speed Two-Step Single Slope ADC Design Method for Hundreds of Mpxiel CMOS Image Sensors 147
Ruiming Xu, Zhongjie Guo, Xinqi Cheng, Changxu Su, Chen Li, Yangle Wang

➢ **Digital Circuits and Systems**

A New Pixel Circuit for Active Matrix Mini&Micro Light Emitting Diodes 152
Wenxue Huo, Juncheng Xiao, Fengchao Xu, Hang Zhou

FPRM Circuit Area Optimization Based on MRFOtent Algorithm 156
Jiahui Lu, Shengsheng Wang

The Design of High-Precision Temperature Measurement Circuit with Time-Sharing Multiplexing 160
Wenxing Lu, Wu Xia, Qing Ye, Cong Huang, Liang Wang

Design and Application of High Power IGBT Drive Circuit 165
Dong Haiyan

Study on the Dynamic R_{on} Degradation in GaN-based Power HEMT 169
Jiaoqi Zhang, Shaoyu Sun, Ling Xia, Wengang Wu, Yufeng Jin

Efficient Approximate Cubing Function Circuits Based on PWL 173
Dongdong Zeng, Yida Yuan, Weiwei Shi, Kezhu Liu, Canji Huang

Design of Real-Time Automatic Gain Control Circuit for Ultra-Low-Frequency (ULF) Communications 178
Huimin Zhou, Qing Wu, Dongxu Sun, Shengxiang Huang, Haipeng Xie, Lianwen Deng

➢ **Microwave and Radar Technology**

The Target Detection Method of Pulse-Doppler Radar Based on Graph Attention Networks 182
Yang Yang, Yang Zhao, Haibo Wang, Dong Cao, Linyan Liu

A Real-Time Data Acquisition System for Coherent Lidar 187
Baolin Chen, Ge Jin, Lian Chen

Feature Extraction Method of UAV Life Detection Radar Signal Based on Markov Transition Field 191
Xin Lu, Zhimin Chen, Yuxuan Jia

Comparison of Coprime Array and Uniform Array in Microwave Power Transfer Based on Time Reversal 195
Zhiyuan Zhang, Bing Li, Shiqi Liu, Chunan Wang, Deshuang Zhao

Character Analysis and Realization of Small Microwave Calibration Source Based on Cone Array 200
Yida Wang, Jiexin Wang, Kai Zhang, Jie Liu, Zhenlin Sun, Siqi Li, Wanyi Liu, Feng Yan

Research of In-situ Type Resistive Sensor for High Power Microwave Pulse Measurement 205
Huilai Li, Zhengfeng Xiong, Meng Yang, Jing Liu, Yunling Miao

➢ **Electrical Theory and New Technology**

Study on Dynamic Response of Slapper Detonator Transducer under Strong Electromagnetic Pulse Field 210
Guo Xiaodong, Lei Fan, Fu Qiubo, Yi Tao, Zhang Zhiming, Wang Liang, Yang Bo

Effect of Epitaxial Layer Parameters on the Avalanche Energy of Power VDMOS 215
Changze Li, Min Ren, Lin Tao, Xin Zhang, Shiheng Yu, Xinzhang Lai, Ningze Zhuo, Bo Zhang

A Non-isolated Three-Port Converter Interfacing Composite Bus in Power Conditioning Unit for Deep Space Detector ... 220
He Liu, Donglai Zhang, Lu Qu, Qiang Tong

The Scheme of Two Stage Power Module Low Surge Current Start 227
Zhiyuan Weng, Min Kong, Gang Zhang, Ying Cheng, Zhigang Weng

AC Voltage Measurement Device Based on AC Josephson Quantum Voltage Standard 232
Wang Ying, Wu Kang, Zhang Junqi, Chen Jiaxu

Application of Terahertz Technology in Delamination Defect Inspection for Vehicle High-Voltage Cable Terminals 238
Shuaibing Li, Binglei Cao, Yongqiang Kang, Hongwei Li, Baopeng Lu, Haiying Dong

Research on Reverse Optimized Control of Dual Active Bridge Based on PSpice-MATLAB/Simulink 243
Rongxian Yi, Shujun Chen, Jingzhang Zhang, Hongyan Zhao, Yue Yu, Hang Zhu

Minimum Sample Size Estimation Method of Electromagnetic Effect Test Based on Confidence Interval 249
Zezheng Hu, Jinliang Cai, Zhen Wang, Feng Qin

Modeling of the Eccentricity Error of Air-Core Coil with Uneven Turns 255
Gang Chen, Shufeng Lu, Feng Ji, Mingrui Xu, Chen Hu, Zenkai Ouyang

➢ **Power Development and Battery Technology**

Design of a Shielding Box for Interference of Switching Power Supply at L-Band 261
Wang Yang, Shen Yangxin, Zhang Hao, Tang Jing, Hu Maozhen

Research on High Precision Oscillator Design with Wide Power Supply Range 265
Jiale Yang, Zhongjie Guo, Hu Lu, Nan Liu

Battery Lifetime Prediction and Capacity Estimation Based on Entropy and Bayesian Neural Networks 270
Meizhu Chen, Xu Song, Yunhong Che

Review of Key Technologies of Low-Carbon Transition on the Power Supply Side 275
Xiangdi Ge, Hui Hou, Tingting Hou, Rengcun Fang, Feng Chen, Jinrui Tang

An Energy Management Strategy Based on Equivalent Consumption Minimum for Hybrid-Electric Aircraft with Battery Cooling System 280
Tianying Yu, Yigeng Huangfu, Hao Bai, Yuntian Liu, Wenzhuo Shi, Zelong Zhang

Electromotive Force Based State of Charge Estimation for Primary Battery Powered Devices 285
Hongli Dai, Wei Liu, Jing Mao, Jian Xie, Shunren Hu

Remaining Useful Life Prediction of Proton Exchange Membrane Fuel Cell Based on Deep Learning 290
Xiangwei Wang

Design of Multi-output Power Supply for Multi-electrode Arc Welding 297
Jingzhang Zhang, Shujun Chen, Hongyan Zhao, Yue Yu

➢ **Electronics and Power Systems**

EV Load Forecasting Methods That Consider the Dispatchable Potential in V2G System 303
Yuqing Zhou, Gaofeng Yang, Yu Lei, Mingmei Zhang, Yulu Yang, Hang Chen, Hanxin Ye, Qingguang Yu

A Scalable Coarse-Grained Reconfigurable Array Based FFT Hardware Accelerator 308
Anlin Xu, Qiang Zhang

The Electromagnetic Interference Effect of the UAV Jammer on Airport Navigation Station 312
Jie Wu, Jiaquan Ye, Jie Zou, Jing Gao, Xueman Sun, Kaitao Cui

Portable Onsite Soybean Contents Analyzer 317
Luyao Liu, Donglin Wang, Nadeem Muhammad Imran, Yan An, Peng Wang, Kun Yang, Zhifeng Zhang

Clock Optimization Techniques 321
Ang Boon Chong, Tan Say Hong, Koh Jid Ian, Mohamad Halim Izzat, Loo Gin Hao, Chin Kevin Che Chau

Prediction of Electromagnetic Pulse Radiation at High Power Laser Facility 327
Yi Tao, Wang Feng, Guo Xiaodong, Yang Yu, Lei Fan, Li Tingshuai, Yang Jiamin, Fu Qiubo

A Distributed Control Strategy for MMC with Low Capacitor Voltage Transmission Requirement 331
Li Wang, Shunfeng Yang, Hang Su, Xiaoyun Feng

➢ **Power Control and Monitoring**

Monitoring of Surface Deformation of Transmission Tower Based on SBAS-InSAR Technology 336
Hao Geng, Jing Peng, Gang Wen, Fangrong Zhou, Meilin Zhe, Xingle Wu, Sheng Dai

Prediction Method of Remaining Service Life of Aviation Transformer Rectifier Based on Improved LSTM Algorithm 343
Yang Liu, Zehai Gao, Molin Chu, Guoquan Yang, Siyuan Li, Cunbao Ma

Using Convolutional Neural Network for Fault Identification and Location in a Power System 349
Sheng-Kuan Wang, Chi-Hao Chang, Victor R. L. Shen

A Method for Suppressing Coloured Background Noise in Low-Voltage Power Lines 355
Fei Zhong, Dong Kang, Xiaoyan Yao, Wenzhou Liu

Power System Equivalent Inertia Estimation Method Using System Identification 360
Huan Ma, Dong Yang, Hao Qin, Yongji Cao, Dingyi Cheng, Bing Zhang, Xudong Hao, Ning Zhou

Optimal Frequency for Implantable Mid-field Wireless Power Transfer 366
Tang Danfeng, Chen Zhiying

Research on Fault Pressure Variation Characteristics of Oil-immersed Power Transformers 371
Jiansheng Li, Xiaoping Yang, Shengquan Wang, Xuan Jiang, Yong Ma

➢ **Electrical Engineering and Automation**

Electric-Field Induced and Highly Deformable Triboelectric Generators from Ionic Gels 376
Yang Lin, Xiuru Xu, Haifei Wang, Zhengchun Peng

Educational Optimization Software for Axial Compressor Flow Path Design 381
Baturin Oleg V., Chongshan Liu, Peng Sun, Kuo Han

Modeling and Simulation of Hybrid Magnetic Bearing as Physical Model in Simscape 386
Han Jinchang, Li Yan, Xiong Feng

Design Technique of Sealing System in Gas Turbine Engine 390
Alexandr Vinogradov, Peng Sun, Chongshan Liu

Reliability Improvement of a 3-Level T-Type Grid-connected Inverter with Dual Vector Modulation Model Predictive Fault-tolerant Control Strategy 395
Zhifeng Dou, Zhinan Chen, Yan Yang, Jiyan Song, Anping Zheng, Xiaoyu An

Unit Commitment Considering Inertia Supply of Both Source and Demand Sides 401
Zhaohui Li, Jianqin Liu, Siwei Liu, Zun Guo, Ming Zhou

Research on Natural Voltage and Current-Sharing Characteristics of Input Series Combined DC Converters 406
Lu Qu, Donglai Zhang, He Liu, Qiang Tong, Jiayu Xu

Control Strategy with Self Voltage-balancing of Cascade Converter 414
Xiaoyu Xu, Xin Wang, Menglu Cai, Chengyong Zhao, Jiazhuo Xuan, Yi Lu

➢ **Smart Electrical Equipment and Control**

Parameter Design of High Power LLC Resonant Converter 421
Weisong Chen, Mingxia Xu, Yanhua Ge, Qiliang Guo, Tao Jiang, Xiangzhong Che

Single Event Effects Radiation Hardened by Design for DC-DC Converter Based on Automatic Detection and Dynamic Compensation 426
Nan Liu, Zhongjie Guo, Hu Lu, Jiale Yang

Design and Fabrication of Dual Substrate RF MEMS Switch with Low Actuation Voltage 431
Yuanyuan Yang, Yun Qi, Yameng Shan, Wenjiang Shen

Research on TSN Test for Smart Substation 437
Xiaoqun Liu, Yong Xie, Jiguang Zhang, Xiaolu Zhou, Xiaoguang Jia, Yingying Chi

Practical Scheme of Optical Voltage Transformer in High Voltage Substations 443
Yuanyuan Dai, Mengqi Zhang, Feng Zhang, Binshu Chen, Haozong Wang, Wenzhong Li, Xinzhou Dong

Control Strategy of Grid-Side Converter for Flywheel Energy Storage System under Grid Asymmetrical Faults 448
Deqiang Yin, Liangzhong Yao, Siyang Liao, Bo Xie, Jian Xu, Beilin Mao

➢ **Smart Grid Control and Management**

A Microgrid Control Strategy Based on Consistency Protocol 453
Jun Wang, Taohong Wang

Research on Multi-Time-Scale Robust Economic Dispatch of Microgrid Considering Discrete Events 459
Liyan Wang, Lei Chen, Jian Du, Lu Tan, Xiaoyang Song, Chongyou Xu, Wenwen Sun

Research on Differentiated Development of Rural and Urban Power Grid under Carbon Neutrality Goals 466
Bai Yu, Cui Kai, Wang Yunfei, Zhao Juan, Liu Yanru, Guo Yue, Ding Yudi, Hou Jia

Distribution Network Reconfiguration Algorithms: A Comparative Study 472
Lingxu Guo, Zhigang Huang, Jing Wang, Guangyao Yu, Yanzhen Zhou, Zhiqiang Chon, Zhenbin Li

Optimal Power Flow Research of Smart Park Distribution Network Control Technique Based on Source-Charge Interaction 479
Baomin Fang, Qian Dai, Chunmeng Chen, Jian Zhang, Dongning Zhao, Guying Zhuo

The Existence Condition for Power-Flow Considering Current Constraints and Control Objectives of DC Microgrids with CPLs under Distributed Control 486
Jiawei Li, Zhangjie Liu, Mei Su, Ruisong Liu

Cluster Partition Method of Distributed Photovoltaics for Voltage Regulation in Distribution Network 491
Hongbin Zhang, Nanjun Lv, Yan Li, Junjie Hu

Typical Defects Detection of I&C Cables in Nuclear Power Plants Based on Time-Frequency Domain Reflection Method 496
Hua Tu, Shu Ma, Lihua Liu, Zhiwu Wang, Xiang Zhang, Lixing Li, Taokun Lin, Honglei Deng

➢ **Thermal and Power Engineering**

Research on Real-time State Identification Model of Electricity-heat System Considering Unbalanced Data 501
Xin Pei, Fei Mei, Jiaqi Gu, Ziping Chen

High Performance Finite Element Algorithm for Electro-thermal Coupling Field Based on High Order Elements 506
Tianyu Xiong, Xiaosong Zhu, Yuan Fang, Shi Long

Electrical and Thermal Analyses of RF-Power GaN HEMT Devices and Layout Optimization 511
Chenyu Wang, Yanpeng Xie, Qianqian Chen, Qiang Chen

Heat Dissipation Performance Analysis of IGBT Module for Flexible HVDC Converter Valve Based on Field-Circuit Combined Simulation 516
Li Liu, Enke Yu

Thermal Design and Transient Analysis of Liquid Cooling Integrated Rack in Spacecraft Cabin 521
Jianzhao Lu, Wei Fang, Jiayu Hu, Dong Wang

Online Junction Temperature Estimation System for IGBT Based on BP Neural Network 526
Yang Yuan, Lei Yunfei, Wen Yang

An Electric-Thermal-Solid Physical Fields Coupling Calculation Based on FELAC Platform 532
Meng Xu, Hua Li, Zhiquan Song, Qianglin Xu, Xining Zhang, Peng Fu

Thermal Management of High Power GaN MMIC on Silicon with Microjet Impingement Cooling 537
Miao Yu, Tongsheng Zuo, Min Huang, Jian Zhu

➢ **Mechanical and Electronic Engineering**

The Application of Different Distance Functions in DS Evidence Theory 544
Jie Chen, Yiliang Li, Mengwei Zhao, Ke Huang, Kunren Wu

The Establishment of Temperature-Dependent DC I-V Model for GaN HEMTs 548
Changyang Huang, Yan Liu, Tao Wang, Zhiqun Cheng, Simin Chen

Research on Bearing Digital Twin Modeling and Residual Life Predictive Simulation Based on Deep Learning 553
Jieting Huang, Tan Li, Weining Song, Zhiming Zheng

Research on the Evalution Method of Surface Warship Low Levels Maintenance Time 558
Xiaobai Liu, Bo Wang, Hongxin Cui

Prediction of Residual Service Life of Rolling Bearingss Based on Cuckoo Search Optimization 563
Weining Song, Jieting Huang, Tan Li

Nozzle Fault Analysis Based on Three-Dimensional Reconstruction of Micron CT 567
Rui Dong, Anji Qu, Yuxiao Deng, Yang Liu

Dual Mix-up Adversarial Domain Adaptation for Machine Remaining Useful Life Prediction 573
Yanjun Dong, Chunhua Zhou, Zhou Wu, Mianzhi Cheng

➢ **Intelligent Control System and Key Technology**

Model and Adaptive Flight-by-Wire Control Law of an Autogyro 579
Su Chenglin, Liu Juanxia, Lin Qing

Robust Bipartite Consensus Tracking for Multi-Agent Systems under Acuator Faults 584
Chenglin Han, Mengji Shi, Rui Li, Jiaqi Lu, Zhiqiang Li, Kaiyu Qin

A Dynamically Configurable Chiplet Testing Technology Based on TAP Controller Architecture 590
Zhikuang Cai, Yunbo Wang

A Grey Wolf Optimizer-Based Topology Shaping Method for UAV Swarm 595
Yanxiang Yang, Xiangyin Zhang, Bo Li, Kaiyu Qin

Study on Corn Ear Drying System Based on Fuzzy Control 601
Dong Shan Zhu, Dong Dong Shi, Yuan Dang

Enhanced Transmission Control Strategies for Reliable Live Streaming in NDN-Based UAV Swarm Networks 606
Junyu Lai, Lixuan Tian, Wanyi Ma, Junhong Zhu

Unmanned Surface Vehicle Heading and Speed Control Method Based on Model Predictive Control 612
Zhiqiang Liu, Qing Xiang, Xi Ye, Linwen Yu

Joint Optimization of Computing Offloading in Multi-UAVs-Assisted MEC System 617
Shanxin Zhang, Zefeng Jiang, Runyu Cao

Tire Pressure Monitoring System Based on Resonant Frequency of Wheel Speed Spectrum 623
Tianshi Shan, Liang Li, Hongyuan Mu, Lu Yu, Zijun Liu

➢ **Energy and Electrical**

Renewable Energy Capacity Credit Assessment Method Considering Source-load Correlation 629
Yuanze Mi, Yongji Cao, Hengxu Zhang, Jinye Yang, Chen Li, Leshu Sun

Optimal Scheduling of Distributed Photovoltaic Power Using Pareto Frontier Principle 635
Yan Li, Junjie Hu, Wei Zeng

Planning Method for Layered and Partitioned Integration of Renewable Energy 640
Jinye Yang, Yongji Cao, Hengxu Zhang, Yuanze Mi, Leshu Sun, Chen Li

Typical Commercial User Adjustable Potential Assessment Method..... 645
Yu Ming, Bin Li, Ke Chen, Weidong Wang, Yajie Wu

Prediction of Household Carbon Emissions Based on SP-LIME and Ensemble Learning Models..... 650
Zhengqi Pang, Ying Kong

Multi-source Based Optimization of Reactive Power of PV Power Station with Sine-Cosine Algorithm 655
Shujun Liu, Guobin Yan, Sizhe Chang, Lv Zhang, Qiangke Qiang, Xiaokun Bu, Cun Wang

➢ **Signal Processing and Methods**

Blood Glucose Detection Based on Waveform Features 659
Hongfeng Long, Chunping Yang, Wei Li, Tian Pu, Zhenming Peng

Parameter Joint Estimation Based on Generalized Cyclic Correlation Spectrum in Alpha-stable Distribution Noise..... 665
Xinxiang Li, Zheng Dou, Yaning Dong, Chuanzhang Wu

Phase-Coded Waveform Design in the Presence of Chopping and Interleaving Jamming 670
Lu Zhang, Wei Ren, Dezhi Tian, Shaoqiang Chang, Quanhua Liu

Real-Time Speech Enhancement Algorithm of Recurrent Neural Network Based on Energy Spectrum Depth Modulation 675
Zhijian Li, Wenjian Mao, Zhaohui Wu, Bin Li

Robust Adaptive Beamforming Based on a Novel Covariance Matrix Selection Strategy 680
Yan Lv, Fei Cao, Jian Yang, Chuan He, Xiaowei Feng, Jianfeng Xu

A High-Resolution SAR ADC Design with Linearity Enhancement Achieving Signal-to-Noise-and- Distortion-Ratio of 97.4dB 685
Zulin Chen, Zongmin Wang, Tieliang Zhang, Song Yang, Long Yang

Joint DOA and Polarization Estimation of Conformal Electromagnetic Vector Array 691
Xiaoyu Lan, Jingzhou Wang, Lai Jiang

Shaped Beam Pattern Synthesis Using Multi-objective Optimization Algorithm 697
Chengyan Zhang, Shuilian Peng, Zhenyu Li, Jiabin Liu

DeepDOA : A Novel Deep Learning-Based Method for DOA Superresolution in a Single Snapshot..... 703
Zihan Yang, Peng Chen, Ruolin Geng, Yuxuan Jia

Signal Analysis and Quality Control of Microwave Links for Rainfall Measurement..... 707
Jiayi Shi

High-Speed Sampling of Column Bus Signal of Large Array CMOS Image Sensor..... 713
Xinqi Cheng, Zhongjie Guo, Ruiming Xu, Changxu Su, Chen Li, Bin Wang

An in Situ Embedded System for Electrocardiography and Photoplethysmography Acquisition 718
Zepeng Huang, Zewei Luo, Liangjian Lyu, Xing Wu

Two-Dimensional DOA Estimation Based on Two-Parallel Arrays Exploiting Nonuniform Array Motions 723
Chun Zhu, Yuwei Wang, Qing Shen

➢ **Antenna Theory and Development Technology**

Broadband Polarization Reconfigurable Antenna with Cross Dipole..... 728
Jing Hao, Xi lian Chen, Ming Su, Yuan an Liu

A Miniaturized Broadband High-performance RFID_tag 733
Yuan Chen, Fanchao Zeng, Tingting Lv, Zhi-Ya Zhang

Broadband Dielectric-Loaded Horn Antenna with Enhanced Gain for 1-18 GHz EMC Applications 737
Yuan Zhang, Dongjun Wang, Lewu Deng, Lei Zhang, Xuedi Yuan, Yu Long

Novel Horn Antenna for Large Element Spacing Phased Array 742
Jianxing Zhuang, Hongchao Wu, Hongbing Sun, Yongpeng Xie

Design and Analysis of Inductance Loading Shortwave Antenna for Warship 747
Siyuan Ma, Qiong Chen, Yang Yang

Dynamic Analysis of Modular Space Deployable Antenna Structure with Multi Fold Rib 752
Lu Jin, Quanyu Cao, Dake Tian, Huili Wang

Wearable Flexible Antenna for Microwave Wireless Power Transfer 757
Xi Liang Chang, Pei Song Chee, Eng Hock Lim

Dynamic Response of Multi-point Continuous Impacts of Modular Space Deployable Antenna 762
Lu Jin, Chunli Zhang, Dake Tian, Huili Wang

A Dual-Polarized Wideband Fabry–Perot Antenna with Enhanced Gain Using Wedge-Shaped Phase Correcting Structure 767
Yunkai Yu, Zhiming Liu, Huilin Zhou, Wei Chen

Design and Development of Micro Position and Orientation System Based on Dual Antenna for Airborne Remote Sensing 772
Chunyu Qu, Jianli Li, Dongkun Yan, Mengdi Wei

Wideband Millimeter-Wave Beam Scanning Dielectric Resonator Antenna 777
Qianrui Shen, Jiayi Chen, Lei Yan, Yitong Jin, Zhiwen Qin, Guangli Yang

➢ **Antenna Design and Optimization**

Design of a Dual Polarized Ku-Band Small Reflector Antenna with Low Sidelobe 781
Pei Qian, Jianmin Zhang, Botao Ye

A Millimeter Wave Band Wide-band Wide Angle 2-D Scanning End-fire Antenna Array 786
Yong Yang, Yong-Ling Ban, Qiang Sun

A Novel Dual-Polarized Millimeter Wave Filtering Antenna for 5G Applications 791
Zhiwen Qin, Qianrui Shen, Yitong Jin, Shaoshuai Hou, Xiyu Zhu, Guangli Yang

A Broadband Frequency Selective Rasorber with Two-Sided Absorption Bands for Radome Application 795
Shenghui Zhao, Zhen Yang, Xiaoyu Pang, Xiaohong Zhang, Meihua Niu, Yixiang Fu

Research on High-Angle Tracking Method of Forward and Backward Mirror Program Guidance by Azimuth-Pitching Antenna 800
Fei Gao, Zhuo Zhang, Zongqing Wu, Guohua Zhao, Min Liang, Yijia Li

E-band High-Gain Antenna Array for Target Detection with Low RCS 806
Yitong Jin, Shaoshuai Hou, Qianrui Shen, Zhiwen Qin, Xiyu Zhu, Guangli Yang

A W-band Wideband Circularly Polarized Reconfigurable Microstrip Antenna 810
Zhongbing Zhou, Minghua Zhao

A Wideband High-gain Antenna Based on Magnetoelectric Dipole 815
Xin Zhou, Jie Tang, Ruoyan Ma, Qianyu Luo, Xinling Wang

Design of a Novel Embedded Shipborne HF Antenna 819
Guoqi Zhang, Gao Wei, Yuhang Zhou, Xichuan Feng

Design of Novel Patch Quadruple Band-notched UWB Antenna 823
Longjie Ge, Han Liu, Letian Tian, Zhiyuan Li

➢ **Communication Principles and Technologies**

Design of a Highly Reliable Redundant Network Card Supporting the IEEE1588 Protocol 830
Bo Zhang, Bingjun Yan, Mingzhe Liu, Aidong Xu, Kai Wang, Zhiping Wang

A Wide-Narrow Hybird Interference Coordination Scheme for Multi-Hop Wide Band Access 837
Di Zhai, Yang Lu, Chen Lin

A 10Gsps TIADC with Mismatch Error Correction Based on Phase-Adjustment Method 842
Ye Haoqi, Jin Ge, Chen Lian

Sub-6GHz Channel Measurements and Modeling for City Underground Power Pipe Gallery 848
Xiaodong Zhou, Sheng Wang, Donglei Zhang, Bo Wang

A Channel Error Calibration Method for Circular Array Radar Based on Curve Fitting 853
Mingjiang Wang, Qiujun Wang, Kun Liang, Kuoye Han

A Joint Time-Frequency Domain Channel Equalization Algorithm for Pulse Burst Synchronous Communication System 857
Shude He, Qin Zhang, Yunlong Wei

A Bidirectional Channel Access Method in Millimeter Wave Dense Deployment Scenario 862
Qi Wang, Yujin Bu, Hao Wu

Receiver System Design for Universal Polyphase DFT Digital Channelization Algorithm 867
Shihang Lu, Zhengyu Su, Kaisheng Liao, Chao Li, Zhuoling Xiao, Bo Yan, Shuisheng Lin, Bo Wu

➢ **Electronics and Communication Engineering**

Recursive Least Square Anti-Jamming Algorithm and FPGA Implementation for BeiDou Navigation 874
Tao Luo, Peng Chen, Zongxin Wang, Yuhuan Zhang

Development and Characterization of a Low Distortion Dual-Channel Arbitrary Waveform Generator 879
Qina Han, Xin Wang, Kunli Zhou, Long Zhao, Jian Yang, Jie Huang, Jifeng Qu

Nonlinear System Identification Using Dynamic Memristor-Based Reservoir Computing System 885
Hongbo Liu, Shukai Duan, Wenwu Jiang, Jie Li, Lidan Wang

Robust Aligned Widely Linear Beamforming 890
Yougen Xu, Xiaorui Zhang, Zhiwen Liu

Dual-polarized Frequency-selective Rasorbers with Two Transmission Bands 896
Haobin Hu, Wenhe Liao, Tingting Liu, Qing An, Liming Hou, Xiang Zhang, Dawei Li

Through Glass Via (TGV) Based Microstrip Interdigital Bandpass Filters 901
Jing Zhou, Jihua Zhang, Wenlei Li, Weicong Jia, Libin Gao, Hongwei Chen, Ting Jiang

Dynamic Reconfiguration Processor for FIR Filter with High Speed, Low Power Consumption and High Flexibility 905
Anlin Xu, Qiang Zhang

Research on Dynamic Differential Filtering Method of MPOS Based on Centralized Kalman Filtering 909
JunFang Bao, Jianli Li, Gang Liu

A New Multistage Filtering Method for Real-Time Tide Observation Method 915
Hai Guo, Yanyan Wang, Yi-Fei Zhang, Peng Wang, Gang Wang

➢ **Wireless Communication and Information Network**

Research on Constructing New Integrated Service Access Areas in the Era of 5G&F5G 920
Lin Yan

Edge Computing Oriented Virtual Optical Network Mapping Strategy Based on Comprehensive Fragmentation Awareness 924
GuoGang Jing, SongYang Wu, BingYi Sun, ShuYuan Chen, XiaoLong Ji

Maintenance of Large Scale Wireless Sensor Networks 929
Quancheng Zhang, Chuchu Dong, Fengqi Yu

Energy-Efficient Data Collection and Trajectory Design for UAV-Enabled Wireless Sensor Network 933
Shanxin Zhang, Runyu Cao, Zefeng Jiang

Joint Optimization of Trajectory and Resource Allocation for Secure UAV Communication with Artificial Noise 939
Fangjian Zheng, Gongchao Su, Bin Chen, Mingjun Dai, Xiaohui Lin, Hui Wang

Optimized Allocation of Protection Centers in Communication Network of Wide Area Protection 944
Tingting Sun, Jiejie Huang

Field Trials for 5G System Roaming as Multi-operator Network Sharing Scheme — User Mobility Problems and Solutions 949
Xiaoyin Zhao, Chunlei Hu, Congjie Mao, Peng Li, Jinyang Yu, Weiliang Xie

An Optimized Routing Protocol for MANETs Based on Multi-metric Dynamic Weighting 954
Siyu Gao, Hai Li, Qin Zhang

A Focusing Metasurface Lens for 5G Communications 959
Shiwan Zhang, Qing Xiong, Yuanliang Ni, Yong Luo

The Power Allocation in Cell-free Massive MIMO with Spatial Correlation and Access Points Selection 964
Xingyu He, Yang Liu

A Low Complexity Power Allocation for an Energy-Efficient Massive MIMO Downlink System 970
Hongmei Liu, Honggui Deng, Yougen Yi, Jie Zhang

Transmission Characteristics of Double Glass in 5G Communication 975
Yuanliang Ni, Qing Xiong, ShiWan Zhang, Yong Luo

➢ **Internet of Things Technology and Engineering Applications**

A DLL-based Router Scheme for the Process-layer Network in Smart Substations 980
Rui Guo, Ai Zheng, Qi Huang, Huabo Sun, Lei Chen

A Levy Flight-Based Offloading Path Decision Scheme in VANET 985
Can Zhao, Xu Ding

Edge-Computing Oriented Robust Routing Scheme in PLC-IoT Networks 994
Libin Zheng, Wenbin Chen, Yang Tian

ZigBee Based Intelligent Bird Driving System Design 998
Linlan Wei, Zehai Gao, Yang Liu, Wenchao Ma, Nan Li, Kangjie MA

Energy Efficient Access Scheduling Mechanism for Monitoring on Power Line Supported by Wide Band Based IoT Networks 1003
Yang Lu, Di Zhai, Junbo Yang

IoT Warehouse Management System Based on ACO Path Planning 1008
Fucheng Men, Junmei Guo, Yizhong Luan

A Lightweight Scalable Blockchain Architecture for IoT Devices 1014
Jingcong Yang, Qi Xia, Jianbin Gao, Isaac Amankona Obiri, Yushan Sun, Wenwu Yang

Lightweight Encryption Authentication Technology for Interconnection of Edge Devices in PDIoT 1019
Zilong Han, Chaoqun Kang, Erxia Li, Dianliang Wu

The Mind Commands You: Combining Brain-Computer Interactions with Augmented Reality to Control Internet of Things (IoT) Tools, and Robotic Platforms 1026
Wang Haohong, Gao Shenghao, Zhao Yimin, Song Maojia, Wang Heng, Damien Constantine Rompapas

➢ **Network and Information Security**

A Rumor Detection Method Based on Multimodal Information Fusion 1032
Zhong Nanjiang, Zhou Guomin, Ding Weijie, Zhang Jiawen

Multi-Node Confirmation Mechanism Based on PC-SCMA Superposition Transmission Systems 1038
Teng He, Dalong Zhang, Xue Wan Zhang, Xin Zheng

Implement Security Analysis of Access Control Policy Based on Constraint by SMT 1043
Aodi Liu, Xuehui Du, Na Wang, Xiaochang Wang, Xiangyu Wu, Jiashun Zhou

Non-intrusive Load Monitoring Based on Deep Convolutional Generative Adversarial Network Prediction 1050
Qifeng Huang, Hanmiao Cheng, Kaijie Fang, Wenbin Yu, Cheng Fan, Yangsong Li

A Novel Space High Speed Data Transmission System of 2.4Gbps 1055
Wenjie Zhao, Yujie Shi, Shengyu Zhou, Xiuxiu Liu, Yan Zhu, Wei Wang, Jianing Rao

Common Information Model for Social Data Extended by IEC 62325 Environmental Package and Its Application in Renewable Energy Accommodation 1060
Xiaowei Fan, Jingran Wang, Wei Qiu, Rongfu Sun, Ran Ding, Yamin Sun, Yuhui Wu, Shanquan Pi

Access Control Model Based on the Privacy of Crowdsourcing Task Content Protection in the Blockchain Environment 1065
Jiaming Zhang, Qi Xia, Yushan Sun

➢ **Pattern Recognition**

Recognition of Catenary Mast Number in Rail Transit 1071
Donglin Wang, Luyao Liu, Xueqian Song, Zhifeng Zhang, Man Xue, Shouting Wang, Tianrui Dong, Nadeem Muhammad Imran

Online Handwriting Recognition Based on Microphone and IMU 1075
Guozheng He, Zhouyi Wu, Yuting Wu, Peiying Lin, Jiangtao Huangfu

The First-Degree Stochastic Dominance Rule of Comparing Pattern Recognition Algorithms with Accuracy Metric 1080
Jun He, Rui-gang Fu

An SVM-Based Pedestrian Gait Recognition Algorithm Using a Foot-Mounted IMU 1085
Jianqiang Chen, Jeffrey Zhu, Meifeng Guo

Recognition of Lower Limb Movements Baesd on Electromyography (EMG) Texture Maps 1091
Xiaxi Si, Yuehong Dai, Junyao Wang

BPrice: An Optimal Price Recommendation Framework Based on Product Identification 1096
Yinxiao Wang

➢ **Target Detection**

Road Target Detection Method Based on Improved Tiny-YOLOV3 1102
Keke Ren, Minghua Zhao

Detection of Miscellaneous Bicycle Lane Based on K-Means Algorithm 1107
Cheng Yuan, Xiangpeng Liu, Danning Wang, Yuhua Cheng

Track Fastener Detection Based on Improved YOLOv4-Tiny Network 1112
Tian Xiao, Tianhua Xu

Country Road Boundaries Detection for Autonomous Driving Based on LiDAR Point Cloud 1117
Song Yin, Lingyun Zhu

A Novel Superpixel Cosegmentation for Change Detection in Remote Sensing Imagery 1121
Weiyong Tong, Yuxi Zhang, Hu Song, Qingqing Song

Railway Structure Diagnosis Based on Swin-Transformer Backbone with Mask R-CNN 1126
Yizhou Wang, Jierui Jiang, Yipiao Hong, Shenghao Gao, Minsi Hu, Chunmao Li, Mingyue Li, Dong Liu

Rail Surface Defects Detection Based on Yolo v5 Integrated with Transformer 1131
Qian Hu, Bo Tang, Lin Jiang, Faxun Zhu, Xiaoke Zhao

Hybrid Optimization of Target Detection on Embedded Platforms for Real Time Applications 1136
Xinchen Zhang, Wangchao Sun, Yaodong Zhao, Kaisheng Liao, Yilin Liu, Hongda Xu, Zhuoling Xiao, Bo Yan

An Pavement Crack Detection Method Based on Edge Computing Platform 1142
Yezi Liu, Chao Xu, Shuting Wang

Inspection of Steel Strip Surface Defects Based on Visual Attention Mechanism 1148
Bo Tang, Yu Li, Wei Sun, Li Chen

Pixel-Level Grasp Detection for Unknown Objects with Encoder-Decoder-Inception Deep Network 1153
Chaoquan Shi, Chunxiao Miao, Xungao Zhong, Xunyu Zhong, Jing Zhao

VGG16 Fire Image Fast Detection Based on Multi-layer Features Fusion 1158
Zhenjie Bao, Yifei Wu, Guangxiu Pan, Yi Liu, Jingyun Hu, Yue Liu

A Novel Facial Manipulation Detection Method Based on Contrastive Learning 1163
Zhiyuan Ma, Pengxiang Xu, Xue Mei, Jie Shen

Real-Time Image Filtering and Edge Detection Method Based on FPGA 1168
Qin Qin, Longyu Sun, Yi Feng

➢ **Image Processing Method and Application**

User-assisted Caching Strategy Based on Reverse Auction and Recommendation in Railway Station 1174
Chenghao Sun, Hao Wu

A Novel Meshless Element Method for Elliptic Equation 1179
Xiaosong Zhu, Xuanhong Liang, Yunhao Qiu, Youyuan Wang

Lathe Tool Wear Monitoring Method Based on Machine Vision 1184
Yufeng Ding, Pucheng Wan, Bo Zhang, Yan Feng

A New Secret Sharing Digital Image Scheme Based on Boolean Operations 1189
Tsung-Ming Lo, Kang-Yu Tan, Wan-Ying Zhang, Yuan-Tong Chen

Hyperspectral Image Classification with Support Vector Machines Based on the Maximum Noise Fraction 1193
Xingyu Shi, Lei Sun

Research on Human Pose Estimation 1198
Ruiyang Sun, Huixin Yang, Lanfei Zhao, Yubin Sun

Improved Steganography Based on Referential Cover and Non-symmetric Embedding 1202
Shichong Fu, Xiaolong Li, Yao Zhao

Image Super-Resolution Method Based on Improved Generative Adversarial Network 1207
Nan Xiang, Bin Tang, Lu Wang

➢ **Advanced Information Theory and Systems**

Research on Tanks Combat Automatic Decision Using Multi-agent A2C Algorithm 1213
Haoluo Jin

A Method Executing Optical Real-Valued Matrix Multiplication 1219
Yao Xiao, Yong Tang, Xizhu Peng, He Tang

Random Matrix-Based Group Target Tracking Using Nonlinear Measurement 1224
Yu Zhang, Peng Chen, Zhenxin Cao, Yuxuan Jia

Blockchain-based Charging Pile Detection Data Uploading and Sharing 1229
Linru Jiang, Taoyong Li, Ran Jiao, Wenbin Zhou, Yuanxing Zhang, Xuan Zhao

Joint Bidding Strategies of Regional Multiple Virtual Power Plants Considering Purchase and Sale Risks 1234
Yadie Fu, Xun Dou

Multi-objective Gray Wolf Optimization Algorithm for Multi-agent Pathfinding Problem 1241
Lianghao Wei, Zhaonian Cai, Kun Zhou

Research on Key Technologies of Energy Router for Urban Rail Transit 1250
Xianyang Cui, Tao Jin, Qiuhong Dai

Cluster Partition Method Development for High Penetration of Distributed Photovoltaics Using Intelligent Algorithm and K-means 1255
Nanjun Lv, Xuetao Liu, Junjie Hu, Hongbin Zhang

➢ **Artificial Intelligence and Applications**

Research on Fire Escape System Based on Virtual Reality Technology 1261
Chuanjie Lei, Siyue Ke, Zhangfei Pei, Wenbo Shao, Shanshan Liu, Yan Wang

Music Generation with AI technology: Is It Possible? 1265
Haowen Tang, Yikun Gu, Xinyu Yang

Research on Intelligent Community "Housekeeper" System Based on Artificial Intelligence 1273
Yuting Zeng, Qinglin Wu

ENIPFuzz: A SeqGAN-based EtherNet/IP Protocol Fuzzing Test Framework 1278
Honggang Wu, Li Gong, Ao Liu, Yi Zhang, Jianwei Yang

Rating the Severity of Toxic Comments Using BERT-Based Deep Learning Method 1283
Ziyu Zhai

An Adaptive Anomaly Detection Method for Cloud Computing System 1289
Xin Jin, Xiwei Qiu

Research on Employee Performance Prediction Based on Machine Learning 1296
Jia Yuan

➢ **Computer and Information Science**

A General Framework for Finding the Optimal Imbalance Ratio in Sampling Methods 1303
Jialin Peng, Yabin Shao, Longhai Huang

Constructing Basic Probability Assignment Based on the Slope Correlation Degree 1308
Jie Chen, Pengcheng Yang, Xiaofei Pu, Hao Xie, Jinxin Wang, Kunren Wu

Text Matching Model with Multi-granularity Term Alignment 1313
Ning Yang, Yabin Shao, Zhen Li

Topic Embedded Representation Enhanced Variational Wasserstein Autoencoder for Text Modeling 1318
Zheng Xiang, Xiaoming Liu, Guan Yang, Yang Liu

DotMat: Solving Cold-Start Problem and Alleviating Sparsity Problem for Recommender Systems 1323
Hao Wang

An Adaptive Voting Mechanism Based on Relative Density for Filtering Label Noises 1327
Longhai Huang, Yabin Shao, Jialin Peng

Research on Load Forecasting Based on CNN-LSTM Hybrid Deep Learning Model 1332
Fang Xu, Guoqing Weng, Qingquan Ye, Qinqin Xia

A Fast Solution Method for Large Scale Linear Sparse Equations Based on Parallelism 1337
Hongrui Gu, Yangjun Luo, Yunhao Qiu, Jinhong Hou

➢ **Author Index**