

2022 5th International Conference on Electronics and Electrical Engineering Technology (EEET 2022)

**Beijing, China
2-4 December 2022**



**IEEE Catalog Number: CFP22DY6-POD
ISBN: 979-8-3503-2043-5**

**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:	CFP22DY6-POD
ISBN (Print-On-Demand):	979-8-3503-2043-5
ISBN (Online):	979-8-3503-2042-8

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 5th International Conference on Electronics and Electrical Engineering Technology (EEET) **EEET 2022**

Table of Contents

Preface	xiii
Conference Committee	xiv
Reviewers	xviii
Sponsors and Supporters	xxi

Machine Vision and Image Processing

Close Contact Individual Monitoring Based on Prescribed Social Distance Using Computer Vision	1
<i>Jelynelle G Bastasa (University of Mindanao Davao City, Philippines), Dary I. Cerina (University of Mindanao Davao City, Philippines), Lester C. Tubo (University of Mindanao Davao City, Philippines), and John A. Bacus (University of Mindanao Davao City, Philippines)</i>	
TomoSAR Imaging Method for Forested Areas Based on Blind Compressed Sensing	9
<i>Yao Zhao (Guangdong University of Technology, China), Xiangyu Meng (Guangdong University of Technology, China), Shuisheng Xie (Guangdong University of Technology, China), Wing-Kuen Ling (Guangdong University of Technology, China), and Li Cui (Beijing Institute of Remote Sensing, China)</i>	
Automated Crack Detection and Measurement Based on Mask R-CNN and Image Analysis with Mobile Application	14
<i>Chrysler S. Gepiga (University of Mindanao, Philippines), Jhehannee P. Magana (University of Mindanao, Philippines), Genaro Alejandro D. Sandoval (University of Mindanao, Philippines), and Randy E. Angelia (University of Mindanao, Philippines)</i>	
A Machine Vision Measurement Method for Large Plates Based on Reference Point Assistance	23
<i>Tianyi Ji (Southeast University, China), Zhiwei Zhao (Southeast University, China), and Ning Zhao (Southeast University, China)</i>	
Bubble Sheet Multiple Choice Mobile Checker with Test Grader using Optical Mark Recognition (OMR) Algorithm	27
<i>Lowell Dave Largo (University of Mindanao, Philippines), Jefril Guillermo (University of Mindanao, Philippines), Adrian Ralph Jancinal (University of Mindanao, Philippines), and Marianne Wata (University of Mindanao, Philippines)</i>	

Efficient Sparse MIMO SAR Imaging with Fast Iterative Method Based on Back Projection and Approximated Observation	34
<i>Pengyu Jiang (Key Laboratory of Technology in Geo-Spatial Information Processing and Application System, Chinese Academy of Sciences, China; Aerospace Information Research Institute, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China), Zhe Zhang (Aerospace Information Research Institute, Chinese Academy of Sciences, China; Suzhou Aerospace Information Research Institute, China; Key Laboratory of Intelligent Aerospace Big Data Application Technology, China), and Bingchen Zhang (Key Laboratory of Technology in Geo-Spatial Information Processing and Application System, Chinese Academy of Sciences, China; Aerospace Information Research Institute, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China)</i>	
Ship Target Detection Framework Based on Non-Image Domain	41
<i>Suyang Xing (Beihang University, China), Fei Zou (Beijing Institute of Remote Sensing Information, China), Wei Qi (Beijing Institute of Tracking and Telecommunications Technology, China), and Wei Yang (Beihang University, China)</i>	

Wireless Communication and Internet of Things Application

High Performance Frequency Up-Conversion Energy Harvester Based on PZT Thick Film Technology for IoT Applications	45
<i>Manjuan Huang (Soochow University, China), Xiaowei Feng (Soochow University, China), Zhenming Li (Electric Power Research Institute, China), and Huicong Liu (Soochow University, China)</i>	
Design of X-Band 6-Bit Wideband Logic Control Phase Shifter	50
<i>Siting Chen (Xiamen University of Technology, China), Xiao Ma (Institute of Microelectronics of the Chinese Academy of Sciences, China), and Chengying Chen (Xiamen University of Technology, China)</i>	
An Electromagnetic Generator for Self-Powered Wireless Sensor Node on Transmission Line	55
<i>Zizhao Wang (Soochow University, China), Manjuan Huang (Soochow University, China), Tianyi Tang (Harbin Institute of Technology, China), Tingting Zhao (Soochow University, China), Zhenming Li (Energy Storage and Novel Technology of Electrical Engineering Department, China), and Huicong Liu (Soochow University, China)</i>	
Power IoT System Security Monitoring Based on Power Consumption Side Channel Information	59
<i>Jiachang Wen (Zhejiang University, China), Chen Yan (Zhejiang University, China), Xiaoyu Ji (Zhejiang University, China), and Wenyuan Xu (Zhejiang University, China)</i>	

Power Transmission System and Protection

Tree-Trimming Device for 10kv Live-Line Based on Conductor Car	66
<i>Bo Zhou (Zhejiang Tusheng Power Transmission and Transformation Engineering Co., Ltd., China), Jian Chen (Zhejiang Tusheng Power Transmission and Transformation Engineering Co., Ltd., China), Yang Qiu (Zhejiang Tusheng Power Transmission and Transformation Engineering Co., Ltd., China), Yiliang Mao (Zhejiang Tusheng Power Transmission and Transformation Engineering Co., Ltd., China), Jinglu Zheng (Zhejiang Tusheng Power Transmission and Transformation Engineering Co., Ltd., China), and Xinglie Lei (China Electrical Power Research Institute, China)</i>	
A Detection Method of Self Explosion Defect of Transmission Line Insulator Based on Cascade R-CNN	71
<i>Shen Houming (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), Zhen Wei (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), Peng Fan (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), Chun Zhao (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), Tao Xie (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), Qin Dong (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), Jiajun Xiong (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China), and Jinjuan Liu (NARI GROUP Liability Corporation, State Grid Electric Power Research Institute Liability Corporation, China; Wuhan NARI Limited Liability Company, State Grid Electric Power Research Institute, China)</i>	
Research on X-ray Detection Technology for Connection Fittings of UHV Transmission Lines Based on Helicopter Live Work	76
<i>Shuai Li (State Grid Electric Power Space Technology Company Limited, China), Nan Wang (State Grid Electric Power Space Technology Company Limited, China), Guangkai Yu (China Electric Power Research Institute, China), and Yong Peng (China Electric Power Research Institute, China)</i>	

CNN-LSTM Combined Prediction Algorithm for Transmission Line Loss Rate Based on Improved SSA	83
<i>Jun Yang (EHV Power Transmission Company, CSG, China), Guanxiong Ren (EHV Power Transmission Company, CSG, China), Lei Luo (EHV Power Transmission Company, CSG, China), Bingyuan Tan (EHV Power Transmission Company, CSG, China), Xiong Xiao (EHV Power Transmission Company, CSG, China), and Jicheng Yu (China Electric Power Research Institute, China)</i>	
Research on Transmission Line Stereo Matching Based on Twin Residual Network	90
<i>Shaoyu Wu (Xixia County Power Supply Company of State Grid Henan Electric Power Company Nanyang, Henan), Xia Wang (Xixia County Power Supply Company of State Grid Henan Electric Power Company Nanyang, Henan), Junwen He (China University of Geosciences (Wuhan), China), and Xiaoxian Song (China University of Geosciences (Wuhan), China)</i>	

Digital Circuit and System Control

Simulation Study on Influencing Factors of Electrical Preventive Test of Insulation Tools	98
<i>Liqun Qian (Zhejiang Huadian Equipment Testing and Research Institute Co., Ltd., China), Qiuwei Zheng (China Electric Power Research Institute, China), Chengbin He (State Grid Zhejiang Electric Power Co., Ltd., China), Weishuo Zheng (Zhejiang Huadian Equipment Testing and Research Institute Co., Ltd., China), Fangfang Wu (Zhejiang Huadian Equipment Testing and Research Institute Co., Ltd., China), and Ting Liu (China Electric Power Research Institute, China)</i>	
A Cyber Security Monitoring Approach for Low-Voltage Distributed Generation Control System Using Both Network Traffic Data and Side-Channel Information	104
<i>Jiandong Si (Taizhou Power Company Zhejiang Electric Power Corporation State Grid, China), Huaiyu Liu (Zhejiang University, China), Zihuai Zheng (Taizhou Power Company Zhejiang Electric Power Corporation State Grid, China), Xueqi Jin (Zhejiang Electric Power Corporation State Grid, China), Dongbo Zhang (Taizhou Power Company Zhejiang Electric Power Corporation State Grid, China), Zhouhong Wang (Taizhou Power Company Zhejiang Electric Power Corporation State Grid, China), and Kaikai Pan (Zhejiang University, China)</i>	
Power Flow Calculation of Small Impedance Branches System Based on Improved Rectangular Coordinate Newton Method	110
<i>Zhijun Niu (Ningxia Institute of Science & Technology, China), Cuiling Zhang (Ningxia Institute of Science & Technology, China), Qiangxian Li (State Grid Liaoning Extra High Voltage Company, China), and Xiaoqin Liu (Liaoning Petrochemical University, China)</i>	
PV Prediction Using Hierarchical BiLSTM-RFR Model Considering Meteorological Factors	120
<i>Rui Zhang (State Grid Anhui Electric Power Co.Ltd, China), Liuzhu Zhu (State Grid Anhui Electric Power Co.Ltd, China), Jianqiao Ye (Hefei University of Technology, China), Shengyu Kuai (State Grid Anhui Electric Power Co.Ltd, China), Xuli Wang (State Grid Anhui Electric Power Co.Ltd, China), Tao Wang (State Grid Anhui Electric Power Co.Ltd, China), and Shenghu Li (Hefei University of Technology, China)</i>	

Experimental Study of Power Definitions in Non-Sinusoidal Condition	126
<i>Mohammad Abu Sarhan (AGH University of Science and Technology, Poland), Andrzej Bien (AGH University of Science and Technology, Poland), and Szymon Barcentewicz (AGH University of Science and Technology, Poland)</i>	
A Review of Control Methods for Quadrotor UAVs	132
<i>Xitong Guo (Tiangong University, China), Shengjie Hou (Academy of Military Sciences, China), Pingjuan Niu (Tiangong University, China), and Di Zhao (Tiangong University, China)</i>	
Research on the Technical System and Evolution of Energy Digitalization	139
<i>Hao Liang (State Grid Corporation of China, China), Dengzheng Wang (State Grid Corporation of China, China), Meimei Xue (State Grid Energy Research Institute Co., Ltd, China), and Xingtong Chen (State Grid Energy Research Institute Co., Ltd, China)</i>	

DC Distribution System and Voltage Control

Research on Topology of Dual Arm Hybrid Direct Current Circuit Breaker and Its Control Scheme	145
<i>RenZhong Shan (North China Institute of Science and Technology, China), JingBo Yang (North China Institute of Science and Technology, China), and ShengLi Huang (North China Institute of Science and Technology, China)</i>	
Energy Release Device for Solving Power Surplus Problem in LCC-VSC Hybrid Cascade Multi-Terminal Transmission Project	153
<i>Kun Xiao (State Grid Corporation of China, China), Shan Liu (State Grid Smart Grid Research Institute Co., Ltd, China), Zhe Jiang (State Grid Smart Grid Research Institute Co., Ltd, China), and Yan Gao (C-EPRI Electric Power Engineering Co., Ltd., China)</i>	
Research on the Principle of Fast Amplitude Measurement Based on AC Surge Voltage Test	158
<i>Mi Liu (Beijing Spacecrafts Ltd Beijing Space Power Conversion and Control Engineering Research Center, China), Junbiao Shi (Beijing Spacecrafts Ltd Beijing Space Power Conversion and Control Engineering Research Center, China), Tao Ma (Beijing Spacecrafts Ltd Beijing Space Power Conversion and Control Engineering Research Center, China), Xiong He (Beijing Spacecrafts Ltd Beijing Space Power Conversion and Control Engineering Research Center, China), Wang Li (Beijing Spacecrafts Ltd Beijing Space Power Conversion and Control Engineering Research Center, China), and Mingming Ji (Beijing Spacecrafts Ltd Beijing Space Power Conversion and Control Engineering Research Center, China)</i>	

Power Flow Modeling and Voltage Imbalance Evaluation for Asymmetric Distribution Network with Single-Phase PV Integration	163
<i>Jingjing Wang (State Grid Anhui Electric Power Co., LTD., China), Dawei Xie (State Grid Anhui Electric Power Co., LTD., China), Qirui Zhao (Hefei University of Technology, China), Wei Peng (State Grid Anhui Electric Power Co., LTD., China), Li Mai (State Grid Anhui Electric Power Co., LTD., China), Xu Wu (State Grid Anhui Electric Power Co., LTD., China), and Shenghu Li (Hefei University of Technology, China)</i>	
Development and Application of Non-Contact Voltage Detector with Metal Cover for UHV DC	170
<i>Wei Shuai (State Grid, China), Qiuwei Zheng (China Electric Power Research Institute, China), Ting Liu (China Electric Power Research Institute, China), and Bo Zhang (Wuhan University, China)</i>	
Active Power Imbalance of Regional Grids including Uncertainty of Renewables and Grid Fault	175
<i>Jiaqing Wang (State Grid Anhui Electric Power Co.Ltd, Hefei, China), Shengyu Kuai (State Grid Anhui Electric Power Co.Ltd Hefei, China), Lulu Li (Hefei University of Technology, Hefei, China), Jia Tian (State Grid Anhui Electric Power Co.Ltd Hefei, China), Qing Liu (State Grid Anhui Electric Power Co.Ltd Hefei, China), Jiayin Xu (Economic & Technical Research Institute State Grid Anhui Electric Power Co.Ltd Hefei, China), and Shenghu Li (Hefei University of Technology Hefei, China)</i>	

Antenna Theory and Design

Study of Fuzzy PID Controller for EMA Optimized with Beetle Antennae Search Algorithm	181
<i>Bu Zhang (Tiangong University, China), Pingjuan Niu (Tiangong University, China), Jin Zhu (Intelligent Equipment Division Beijing Interstellar Glory Space Technology Co., Ltd, China), and Xitong Guo (Tiangong University, China)</i>	
Research on Compressed Slot Antenna Resonating at Higher Order Modes	186
<i>Ruiqi Pan (Tianjin University, China), Yu Luo (Tianjin University, China), Ningning Yan (Tianjin University, China), and Kaixue Ma (Tianjin University, China)</i>	
Research on Wireless Charging System Based on Bilateral LCC	191
<i>Hao Sun (Tiangong University, China), Yanjun Cui (Tiangong University, China), Wenchao Song (Tiangong University, China), and Xitong Guo (Tiangong University, China)</i>	
Miniaturized Maxwell Fisheye Lens for Terahertz Multibeam Luneburg Lens Antenna	196
<i>Yujiao Guo (Beijing Jiaotong University, China), Yujian Li (Beijing Jiaotong University, China), and Junhong Wang (Beijing Jiaotong University, China)</i>	
Recognition for Radar Emitter Signals Based on Bispectral Feature Fusion	201
<i>Jundi Wang (Air Force Engineering University, China), Xing Wang (Air Force Engineering University, China), Pengyu Dong (Air Force Engineering University, China), You Chen (Air Force Engineering University, China), and Yuanrong Tian (National University of Defense Technology, China)</i>	

Modern Electronic Devices and Structural Design

A Flexible Solar-Blind Ultraviolet Photodetector Based on Carbon Dots	211
<i>Zikang Han (Southeast University, China), Mengru Zhu (Southeast University, China), Yifan Gao (Southeast University, China), Keyang Zhang (Southeast University, China), Chifeng Song (Southeast University, China), and Zhiwei Zhao (Southeast University, China)</i>	
Design and Analysis of the Controller for Novel 6- DOF Magnetic Suspension Platform	216
<i>Yu Lu Meng (TianGong University, China), Ping Juan Niu (TianGong University, China), Shi Nan Cao (TianGong University, China), and Jie Bai (TianGong University, China)</i>	
Performance Study of Flexible Solar-Blind Ultraviolet Photodetector	221
<i>Yifan Gao (Southeast University, China), Mengru Zhu (Southeast University, China), Xinyue Chen (Southeast University, China), Zikang Han (Southeast University, China), Chifeng Song (Southeast University, China), Keyang Zhang (Southeast University, China), and Zhiwei Zhao (Southeast University, China)</i>	
Preparation and Pressure Sensitivity Extraction of Flexible MWCNT-PDMS Pressure Sensors	226
<i>Jianguo Zhang (Nanjing University of Science and Technology, China), Xingyi Wu (Nanjing University of Science and Technology, China), Xiaobo Zhu (Nanjing University of Science and Technology, China), Yutao Yue (Institute of Depth Perception Technology, China), and Wenhua Gu (Nanjing University of Science and Technology, China)</i>	
Design Method of Split Capacitance Value of ANPC Half Bridge Photovoltaic(PV) Submodule	232
<i>Kailong Chen (State Grid Smart Research Institute Co., Ltd., China), Weihua Deng (State Grid Smart Research Institute Co., Ltd., China), Naizheng Han (State Grid Smart Research Institute Co., Ltd., China), Hong Lu (Sichuan University, China), Zhe Jiang (State Grid Smart Research Institute Co., Ltd., China), and Yali Liu (State Grid Smart Research Institute Co., Ltd., China)</i>	
A Novel Discharge Electrode Structure to Increase the Times of Shockwaves Generation	239
<i>Chengxi Li (Shanghai University, China), Rui Zhang (University of Science and Technology of China, China), Weiwei Shao (Suzhou Institute of Biomedical Engineering and Technology (SIBET), Chinese Academy of Sciences, China), Peiyang Li (Fudan University, China), Yaoyao Cui (Suzhou Institute of Biomedical Engineering and Technology (SIBET), Chinese Academy of Sciences, China), and Chi Wang (Shanghai University, China)</i>	
A Vertical Structured Solar-Blind Ultraviolet Photodetector Based on Carbon Dots/Graphene	244
<i>Keyang Zhang (Southeast University, China), Chifeng Song (Southeast University, China), Taihao Chen (Southeast University, China), Yifan Gao (Southeast University, China), Zikang Han (Southeast University, China), and Zhiwei Zhao (Southeast University, China)</i>	
Study on Long-Term Stability of the Ring Laser Gyro's Scale Factor	249
<i>Hao Liang (Nanjing University of Science and Technology, China), Yu Guo (Nanjing University of Science and Technology, China), and Xingfa Zhao (Beijing Aerospace Times Laser Inertial Technology Company, Ltd., China)</i>	

Author Index 257