

# **2023 IEEE International Conference on Industrial Technology (ICIT 2023)**

**Orlando, Florida, USA  
4 – 6 April 2023**



**IEEE Catalog Number: CFP23CIT-POD  
ISBN: 979-8-3503-3651-1**

**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:	CFP23CIT-POD
ISBN (Print-On-Demand):	979-8-3503-3651-1
ISBN (Online):	979-8-3503-3650-4
ISSN:	2641-0184

**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)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## TABLE OF CONTENTS

Flexible Activation Bag: Learning Activation Functions in Autoencoder Networks.....	1
<i>Hendrik Klopries, Andreas Schwung</i>	
Reflection-Based Prototyping Framework for OPC UA Servers for Companion Specifications .....	8
<i>Moritz Walker, Christian Von Arnim, Michael Neubauer, Armin Lechler, Oliver Riedel, Alexander Verl</i>	
Effects of Wind Noise on Hybrid Active Noise Cancellation Headphones .....	14
<i>Takeru Watanabe, Seiji Kanai, Takenori Atsumi</i>	
Analytical Modelling of a Hybrid Reluctance Motor Based on Magnetic Equivalent Circuit .....	20
<i>Xinyi Su, Xiaofeng Yang, Yunlang Xu</i>	
Reinforcement Learning of LQR Control Policy by a Double Inverted-Pendulum Biomechanical Model .....	26
<i>Kamran Iqbal, Muhammad Haras</i>	
A Data-Driven Hybrid Automaton Framework to Modeling Complex Dynamical Systems.....	32
<i>Yejiang Yang, Zihao Mo, Weiming Xiang</i>	
Virtual Cable: Beam-Direction Converter for IoT Communications Inside a Motor .....	38
<i>Daisuke Kobuchi, Keisuke Manabe, Yuta Fuchigami, Yoshiaki Narusue, Hiroyuki Morikawa</i>	
Enhanced Power-Sharing Control Algorithm for Dual-Inverter-Fed Open-End-Winding Induction Motor in Hybrid Electric Vehicles.....	44
<i>Khaled Safsouf, Jean Sawma, Hadi Y. Kanaan</i>	
A Python Framework for System-on-Chip Power Integrity Simulation.....	50
<i>C. Panagiotopoulou, A. Michailidis, T. Noulis, K. Siozios, S. Siskos</i>	
Smart Highways Based Vehicle Speed Sensor with Piezoelectric Energy Harvesting: A Progress Report.....	55
<i>Keven Charles Rall, Kara Leah Bailen, Elizabeth Nicole Bender, Luay Yassin Taha, Hussein M Abdeltawab, Sohail Anwar</i>	
A Deep Multi-Modal Cyber-Attack Detection in Industrial Control Systems.....	61
<i>Sepideh Bahadoripour, Ethan Macdonald, Hadis Karimipour</i>	
Performance Improvement of Flexible Common Ground Flying Capacitor PV Inverter Using Model Predictive Control .....	67
<i>Margarita Norambuena, Guillermo Huerta, Mohktar Aly, Fernanda Carnielutti, Jose Rodriguez</i>	
Guaranteed Quantization Error Computation for Neural Network Model Compression .....	72
<i>Wesley Cooke, Zihao Mo, Weiming Xiang</i>	
Development of a Smart Photovoltaic Cell .....	76
<i>Zoi Agorastou, Vasiliki Gogolou, Ioannis Mandourarakis, Nick Rigogiannis, Eftichios Koutroulis, Stylianos Siskos, Nick Papanikolaou</i>	
KeyState: Improving Image-Based Reinforcement Learning with Keypoint for Robot Control .....	81
<i>Ling-Chen Chen, Chi-Kai Ho, Chung-Ta King</i>	

Reconfigurable LNA with On-Line Fine-Tuning of Linearity and Gain for 5G Industrial Communications Applications.....	87
<i>Athanasios Stefanou, Vasilios Pavlidis, Alkiviadis Hatzopoulos</i>	
Energy Prosumer for Local Energy Marketplace .....	92
<i>Ameni Boumaiza, Antonio Sanfilippo</i>	
Utilization of ABC/XYZ Analysis in Retail Sales Forecasting Using Multivariate LSTM Method .....	97
<i>Naomi Munitic, Mia Barzic, Luka Jelic, Vinko Lesic</i>	
A Mixed Reality Guidance System to Assist the Operator in the Assembly Process of Complex Products.....	103
<i>Gennaro Gemito, Adolfo Santoro</i>	
Extended State Observer Based Distributed Composite Control Strategy for DC Microgrid .....	109
<i>Ruifang Zhang, Wensheng Luo, Sergio Vazquez, Ligang Wu, Leopoldo G. Franquelo, Ping He</i>	
Alternative Feedback Quantizer Using Space Vector Modulation .....	115
<i>Matias Veillon, Eduardo Espinosa, Ricardo Lizana, Pedro Melin, Galina Mirzaeva, Marco Rivera, Neil Sepulveda</i>	
Development of UAV Localization and Navigation Techniques for Warehouse Inventory Inspection.....	121
<i>Yi-Hao Li, Huei-Yung Lin</i>	
Modelization and Identification of Feed Drive Axis in CNC Machine Tools Using Two-Mass Model and Particle Swarm Optimization .....	127
<i>Jing-Xiang Zhang, Syh-Shiuh Yeh</i>	
Support Vector Machine Aided Diagnosis of Concurrent Multiple Faults in Induction Motor .....	132
<i>Kenichi Yatsugi, Esakimuthu Pandarakone Shrinathan, Yukio Mizuno, Hisahide Nakamura</i>	
PlastOPol: A Collaborative Data-Driven Solution for Marine Litter Detection and Monitoring .....	138
<i>Jincheng Liu, Di Wu, Christina Carrozzo Hellevik, Hao Wang</i>	
Accelerated Geophysical Inversion for Airborne Transient Electromagnetic Data Using GPU.....	144
<i>Nengyi Fu, Heng-Ming Tai</i>	
Developing Energy Analytics for Small Commercial Buildings .....	149
<i>Suhas Raju, Robert W. Cox, Benjamin J. Futrell</i>	
Adaptable Simulation Environment for LED Streetlight Dimming Control System.....	157
<i>Marina Gapit, Husam I. Shaheen, Vinko Lešic</i>	
Asymmetric Switching Angle Modulation for Cascaded Multilevel Power Inverters for Different Grid Support Functionalities .....	163
<i>Shuo Wang</i>	
Human Age Prediction Based on Brain MRI Using Density-Based Regression .....	169
<i>Ornela Bregu, Nuha Zamzami, Nizar Bouguila</i>	
Blockchain-Based Local Energy Marketplace Agent-Based Modeling and Simulation .....	175
<i>Ameni Boumaiza, Antonio Sanfilippo</i>	
A Hybrid Continual Learning Approach for Efficient Hierarchical Classification of it Support Tickets in the Presence of Class Overlap.....	180
<i>Yasmen Wahba, Nazim H. Madhavji, John Steinbacher</i>	

Staircase Modulation for Asymmetric Inverters with Minimum WTHD .....	186
<i>Eduardo Espinosa, Matías Veillón, Pedro Melin, Carlos Baier, José Espinoza, J. C. Hernandez</i>	
Data Synthesizing for Specific Human Action Segmentation .....	191
<i>Xiaotian Lin, Leiyang Xu, Qiang Wang</i>	
Building Manufacturing Deep Learning Models with Minimal and Imbalanced Training Data Using Domain Adaptation and Data Augmentation .....	197
<i>Adrian Shuai Li, Elisa Bertino, Rih-Teng Wu, Ting-Yan Wu</i>	
Real Time Enhancement of Operator's Ergonomics in Physical Human - Robot Collaboration Scenarios Using a Multi-Stereo Camera System .....	205
<i>Gerasimos Arvanitis, Nikos Piperigkos, Christos Anagnostopoulos, Aris S. Lalos, Konstantinos Moustakas</i>	
Work in Progress: Output Impedance Specification of a Three-Phase Current-Source Inverter for Modular Photovoltaic Applications .....	211
<i>Qilin Peng, Giovanni Migliazza, Giampaolo Buticchi, Sandro Guenter, Nadia M. L. Tan, Jiajun Yang, Patrick Wheeler</i>	
Using Image Pre-Processing to Improve Navigation Line Extraction Based on Pix2Pix Net on Small-Size Datasets .....	215
<i>Hao Zheng, Qiang Wang</i>	
A PYNQ-Based Data Acquisition System for HIL Simulations on Low-Cost FPGAs .....	221
<i>Thibaut Gravey, Karim Meddah, Téo Robert, Emmanuel Rutovic, Romain Monthéard, Tarek Ould-Bachir</i>	
A Novel Approach of Planar Transformer Configuration for Reducing Parasitic Capacitances and Enhancing Resonant Converters Parameters .....	227
<i>Haitham M. Kanakri, Euzeli Cipriano Dos Santos, Maher Rizkalla</i>	
Cloud-Based Learning for Robot Control .....	233
<i>Shane Harrigan, Sonya Coleman, Dermot Kerr, Justin Quinn, Leanne Lindsay, Kyle Madden</i>	
Observer-Based Model Predictive Control with Continuous Control Set for Single-Phase Rectifiers.....	237
<i>Milad Dehghanzadeh, Rui Bo, Kamal Al-Haddad</i>	
Model Predictive Control of Asynchronously Switched Systems with Exogenous Disturbances.....	241
<i>Tianyu Tan, Xinxin Shang, Liu Yang, Yang Shi</i>	
Smart AR Workstation Configuration in Industrial Assembly Lines.....	247
<i>Abhaya Dhathri Arige, Marius Preda, Titus Zaharia</i>	
Vehicle State Classification from Drone Image.....	251
<i>Youlkyeong Lee, Seongmin Kim, Jehwan Choi, Kanghyun Jo</i>	
Li-Ion Battery Health State Estimation with Two Feed Forward Neural Networks .....	256
<i>Junghwan Lee</i>	
Artificial Intelligence Data-Driven Petri Nets Approach for Virtualizing Digital Twins .....	262
<i>Alexandre Oliveira Júnior, José-Luis Calvo-Rolle, Paulo Leitão</i>	
Keeping Workers Safe in Electric Working: A Robot System for High-Voltage Live Operation .....	268
<i>Longqiang Wang, Ruohan Wang, Haiteng Wu, Geng Yang</i>	

Utilising the Capabilities of Next-Generation PLC Controllers for ICSs Protection from Cyber Threats.....	273
<i>M. Slunjski, D. Sumina</i>	
An Intrusion Detection System Dataset for a Multi-Agent Cyber-Physical Conveyor System.....	279
<i>Gustavo Funchal, Farzana Zahid, Victoria Melo, Matthew M. Y. Kuo, Tiago Pedrosa, Roopak Sinha, Fernando De La Prieta, Paulo Leitao</i>	
Radar and Infra-Red Array Sensor Fusion in a Robotized Environment: An Experimental Study .....	285
<i>Alberto Minora, Leonardo Costa, Denys Tolochenko, Sanaz Kianoush, Vittorio Rampa, Stefano Savazzi</i>	
An IoT Oriented Ontology for Physical World Awareness in Autonomous Objects .....	293
<i>Riccardo Brama, Helbert Da Rocha</i>	
Maximum Likelihood-Based Estimation of Finite Multivariate Libby-Novick Beta Mixture Models in Medical Applications.....	299
<i>Niloufar Samiee, Narges Manouchehri, Nizar Bouguila</i>	
Phone Pick-Up Authentication: A Gesture-Based Smartphone Authentication Mechanism .....	306
<i>Dutliff Boshoff, Alexander Scriba, Raphael Nkrow, Gerhard P. Hancke</i>	
Attack-Resilience Distributed Model Predictive Control of Vehicular Platoon Systems Using Moving Horizon Attack Estimation.....	312
<i>Jicheng Chen, Zhi Qi, Hui Zhang</i>	
Dynamics Analysis of an Optimal Fourth-Order Biparametric Jarratt-Type Method.....	317
<i>Wenshuo Li, Xiaofeng Wang</i>	
Design and Implementation of Real-Time Fire Segmentation Algorithm on PYNQ Z2 FPGA.....	323
<i>Pratap A Kygonahalli, Pranav V Deshpande, Abhishek Hegde, Pranav Sasikumar, Akash Gupta, Payal Sharma, J Manikandan</i>	
Distributed Lidar Based Control for Cooperative Transportation with Multiple Autonomous Mobile Robots.....	329
<i>Stefano Mutti, Giovanni Dimauro</i>	
NTSM Based Adaptive Finite-Time Synchronization for Bilateral Teleoperators with Asymmetrical Delay and Disturbances .....	334
<i>Shafiqul Islam</i>	
Structural Loads Reduction in Wind Turbines Via Set-Based Control.....	340
<i>Ivan Grabic, Mario Vašak</i>	
ChatGPT and Generative AI Guidelines for Addressing Academic Integrity and Augmenting Pre-Existing Chatbots .....	346
<i>Daswin De Silva, Nishan Mills, Mona El-Ayoubi, Milos Manic, Daminda Alahakoon</i>	
Industry 4.0-Compliant Digitalization of a Re-Configurable and Flexible Laser Cutter Module Within a Digital Factory .....	352
<i>Khedr Kanaan, Jeffrey Wermann, Martin Alejandro Bär, Armando Walter Colombo</i>	
Convergence Analysis for Delay Dependent LFC Scheme for Power Systems Networks Over Open Communication Networks with Disturbances .....	359
<i>Shafiqul Islam</i>	

Adaptive Sliding Mode Control for Interconnected Power Systems Networks with Disturbances.....	365
<i>Shafiqul Islam</i>	
3D Multi-Views Object Classification Based on a Fully Generalized Dirichlet Allocation Model.....	372
<i>Ahmed Yasser Eita, Hafsa Ennajari, Nizar Bouguila</i>	
Kalman Filter-Based Adversarial Patch Attack Defense for Autonomous Driving Multi-Target Tracking.....	379
<i>Ru Yi, Jicheng Chen</i>	
NTSM Based Finite-Time Consensus Control for a Networked of Quadrotor Vehicles with Disturbances .....	385
<i>Shafiqul Islam</i>	
System Identification and Decoupling Controller Design for Fuel Cell Hydrogen Injection System .....	391
<i>Silong Zhang, Shaodong Zhou, Wenhao Gan</i>	
Multimodal Camera for Pedestrian Detection with Deep Learning Models.....	396
<i>Adam Dradrach, Jakub Konert, Jacek Ruminski</i>	
Analysis of Automatic Emergency Braking System Performance Insufficiency Based on System Theory Process Analysis.....	402
<i>Jicheng Chen, Silong Zhang, Shaodong Zhou</i>	
Feature Extraction Algorithm Based on Improved ORB with Adaptive Threshold .....	407
<i>Shaoshao Wang, Aihua Zhang, Yuhao Li</i>	
EMD-KPCA Based Short Circuit Fault Diagnosis Method for Battery Pack.....	413
<i>Yuchen Qian, Han Lin</i>	
Game-Based Adaptive Optimization Approach for Multi-Agent Systems .....	421
<i>Hao Wang, Zheyuan Ning, Hao Luo, Yuchen Jiang, Mingyi Huo</i>	
Time-Domain Frequency Estimation Approach for Intelligent Control Systems.....	426
<i>Mingyi Huo, Xinyu Qiao, Hao Wang, Yuchen Jiang, Hao Luo</i>	
Hybrid Building Occupancy Estimation Using Thermal Imaging and Environmental Sensing.....	431
<i>Daniel S. Barros, António M. R. Da Cruz, Sérgio Ivan Lopes</i>	
Development of Electrical Cabinet Prototypes Based on Technology of Laminated Conductors.....	437
<i>Josipa Stegic, Marija Odak, Igor Erceg, Damir Sumina, Elvedin Topcagic</i>	
Development of Joint Actuators for Human-Friendly Manipulators with Low Inertia and Easy Assembly.....	443
<i>Kazuma Morikawa, Seiichiro Katsura</i>	
Intelligent Control of an Islanded Hybrid Microgrid.....	449
<i>Mohammad Khenar, Emad Samadaei, Camille-Laurie Normandeau, Jean-Nicolas Paquin, Kamal Al-Haddad</i>	
Parameters Design of Composite Resonant Circuit for Outputting Dual Frequency Signals with Different Frequency Ratios .....	455
<i>Qingfeng Liu, Zhaoxia Leng, Mengxi Zhou, Bo Zhong</i>	
A Blockchain Based Framework for Secure and Decentralized Energy Trading in a Community .....	463
<i>Saurabh Sachdeva, Latif Fatehaj, Stefan Tan, Joel James, Oluwaseyi Ajayi, Tarek Saadawi</i>	

Circuit Design of Multimodal Attention Memristive Network for Affective Video Content Analysis.....	471
<i>Xiaoyue Ji, Zhekang Dong, Chun Sing Lai</i>	
Expanding the Frequency Range of 2 <sup>nd</sup> Order Sinewave Oscillators with Composite Amplifiers .....	476
<i>António Coelho, José Salvado, António Espírito-Santo</i>	
Voltage Balancing and Energy Sorting of 17L-ZPUC-Based Modular Multilevel Converter.....	480
<i>Sandy Atanalian, Fadia Sebaaly, Rawad Zgheib, Kamal Al-Haddad</i>	
SDR-Based 5G NR C-Band I/Q Monitoring and Surveillance in Urban Area Using a Helikite .....	484
<i>Sung Joon Maeng, Ozgur Ozdemir, Ismail Güvenç, Mihail L. Sichitiu, Magreth Mushi, Rudra Dutta, Monisha Ghosh</i>	
Modular Multilevel Converters for Fast Charging Stations of Electric Vehicles: An Overview .....	490
<i>Sandy Atanalian, Fadia Sebaaly, Rawad Zgheib, Kamal Al-Haddad</i>	
Encryption and Authentication in Smart Transducers Implemented in RISC-V Softcore Processors .....	496
<i>João Cassiano V. Fernandes, Helbert Da Rocha, António Espírito-Santo</i>	
An Analysis of Advanced Soft-Switching Techniques for DC–AC Power Converters Based on Auxiliary Circuits .....	502
<i>Kushan Tharuka Lulbadda, Ruvini De Seram, Niranjana Shrestha, Tarlochan Sidhu, Sheldon S. Williamson</i>	
Design of a Four Windings Coupled Inductors for High Frequency Converters Applications.....	508
<i>Loïc Duong, Cédric Somers, Kamal Al-Haddad</i>	
Adaptive Frequency Hopping for 5G New Radio mMTC Security .....	514
<i>Wai Ming Chan, Hyuck M. Kwon, Rémi A. Chou, David J. Love, Sonia Fahmy, Syed Rafiul Hussain, Sang Wu Kim, Chris Vander Valk, Christopher G. Brinton, Vuk Marojevic, Khanh D. Pham, Taejoon Kim</i>	
Sensor Compliance Development for Smart Lift Safety Application Based on IEEE 2668.....	519
<i>Yang Wei, Kim Fung Tsang, Hao Wang</i>	
Delay Optimal UAV Trajectory Planning for Secure Data Collection from Mobile IoT Networks .....	523
<i>Amirahmad Chapnevis, Eyuphan Bulut</i>	
Federated Learning in Healthcare Industry: Mammography Case Study .....	527
<i>Krystian Zielinski, Natalia Kowalczyk, Tomasz Kocejko, Magdalena Mazur-Milecka, Tomasz Neumann, Jacek Ruminski</i>	
Distributed Power Allocation for 6-GHz Unlicensed Spectrum Sharing Via Multi-Agent Deep Reinforcement Learning .....	533
<i>Xiang Zhang, Arupjyoti Bhuyan, Sneha Kumar Kasera, Mingyue Ji</i>	
O-RAN Perspective on Industrial Internet of Things: A SWOT Analysis.....	539
<i>Talha Faizur Rahman, Minglong Zhang, Vuk Marojevic</i>	
Improved YOLOv5 Network with CBAM for Object Detection Vision Drone .....	545
<i>Jinsu An, Muhamad Dwisnanto Putro, Adri Priadana, Kang-Hyun Jo</i>	
Energy-Efficient Secure Offloading for NOMA-Enabled Machine-Type Mobile-Edge Computing .....	551
<i>Yuan Zhou, Haijian Sun, Xiang Ma, Rose Qingyang Hu</i>	



Denoising of Photoplethysmograms for Non-Invasive Blood Glucose Estimation Via Slant Transform Based Bit Plane Method.....	557
<i>Weizhi Guo, Bingo Wing-Kuen Ling, Yiting Wei</i>	
Systolic Peak Detection of Photoplethysmograms Via Regularity Approach.....	561
<i>Yiting Wei, Bingo Wing-Kuen Ling, Qing Liu, Jiixin Liu</i>	
Vision Guided Drone Flight for Entering Confined Spaces for Inspection .....	565
<i>Sambit Bhattacharya, Catherine Spooner, Erik Wemlinger</i>	
Mining Popular Trends from TED Talk Data .....	569
<i>Colin N. Johnson, Jay Khakhariya, Carson K. Leung, Adam G. M. Pazdor, Steven J. Peters, Aaron M. Salo</i>	
Mining Big Healthcare Data to Predict Long COVID Cases .....	575
<i>Katrina Dotzlaw, Ryan Dotzlaw, Carson K. Leung, Adam G. M. Pazdor, Sean Szturm, Da Tan</i>	
Informed Deep Learning for Anomaly Detection in Cyber-Physical Systems .....	581
<i>Victor Cobilean, Harindra S. Mavikumbure, Chathurika S. Wickramasinghe, Daniel L. Marino, Milos Manic</i>	
Bringing DNS Service to 5G Edge for Reduced Latencies in mMTC Applications .....	588
<i>Ricardo Harrilal-Parchment, Diana Pineda, Kemal Akkaya, Abdullah Aydeger, Alexander Perez-Pons</i>	

**Author Index**