

2024 35th Irish Signals and Systems Conference (ISSC 2024)

**Belfast, United Kingdom
13-14 June 2024**



**IEEE Catalog Number: CFP24B57-POD
ISBN: 979-8-3503-5299-3**

**Copyright © 2024 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:	CFP24B57-POD
ISBN (Print-On-Demand):	979-8-3503-5299-3
ISBN (Online):	979-8-3503-5298-6
ISSN:	2688-1446

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

TABLE OF CONTENTS

Modelling and Simulating Advanced Cyber-Threats to Industrial Control Systems with an Emulated Testbed	1
<i>Conrad Ekisa, Diarmuid Ó Briain, Yvonne Kavanagh</i>	
Accelerating Deep Learning for Self-Calibration in Large-Scale Uncontrolled Wireless Sensor Networks for Environmental Monitoring	7
<i>Asif Yar, Shagufta Henna, Marion McAfee, Salem S. Gharbia</i>	
MAD-STORM: Maneuverable Autonomous Drone with Sensing Technologies for Observing Rainfall and Meteorology in Northern Ireland	13
<i>Rajkamal Rajathanakodi, Muhammad Usman Hadi</i>	
A Reinforcement Learning Control and Fault Detection Method for the MADNI Drone.....	19
<i>Cara Rose, Robert McMurray, Muhammad Usman Hadi</i>	
Leveraging the MITRE ATT&CK Framework for Threat Identification and Evaluation in Industrial Control System Simulations	25
<i>Conrad Ekisa, Diarmuid Ó Briain, Yvonne Kavanagh</i>	
The Trick of the Tail: Segmenting Heavy-Tailed Distributions	31
<i>Jonathan Dunne, Sonya Leech, Markus Muller, Irene Manotas, Mary Swift</i>	
Uncertainty Calibrated Deep Regression for QT Interval Measurement in Reduced Lead Set ECGs	37
<i>Peter Doggart, Alan Kennedy, Raymond Bond, Dewar Finlay</i>	
Predicting Football Match Outcomes Using Event Data and Machine Learning Algorithms	43
<i>Peter Hassard, Dermot Kerr</i>	
An Evaluation of FNV Non-Cryptographic Hash Functions.....	49
<i>Catherine Hayes, David Malone</i>	
Resource Allocation for the IEEE 802.11ax OFDMA Mechanism Based on Dynamic Programming Combined with Timsort.....	57
<i>Yang Yu, Mark Davis</i>	
3D LiDAR Data Augmentation for Off-Highway Vehicle Applications	63
<i>Mike Edgar, De Jong Yeong, Krishna Panduru, Daniel Riordan, Joseph Walsh</i>	
Evaluation Metrics: A Review of Decision Methods for Vibration Based Condition Monitoring	69
<i>Ietezaz Ul Hassan, Krishna Panduru, Joseph Walsh</i>	
A Comprehensive Data Collection System for Agricultural Machinery.....	75
<i>Krishna Panduru, De Jong Yeong, Joseph Walsh</i>	
Smart Agriculture: Software Platform for Telematics Monitoring in Farm Machinery.....	81
<i>De Jong Yeong, Krishna Panduru, Joseph Walsh</i>	
Mathematical Modelling of Froude-Krylov Forces and Moments Using Dynamic Parameterised Surfaces	87
<i>Jander P. Santos, Matheus M. G. Costa, Josefredo G. Silva, Ariadne L. J. Bertolin, Erivelton Nepomuceno</i>	

Advancements and Applications of Electronically Steerable Parasitic Array Radiator (ESPAR) Antennas in Wireless Communications	93
<i>Luis Eduardo Partichelli Potrich, Jonathan Guimaraes Ribeiro, Ronan Farrell, John Dooley</i>	
Digital Twin Bridging: Enabling Virtual Worlds to Manifest in the Physical	99
<i>Adam Dooley, Mihai Penica, Sean McGrath, William O'Brien, Mangolika Bhattacharya, Eoin O'Connell</i>	
Optimizing MIMO Detection with DM-Detnet in 6G Networks	105
<i>Muhammad Yunis Daha, Joseph Rafferty, Muhammad Ikram Ashraf, Muhammad Usman Hadi</i>	
Experimental Evaluation of Horner's Method for CPU Energy Reduction in Nonlinear Modelling.....	111
<i>Jordan Browne, Thalita Nazaré, Erivelton Nepumecuno</i>	
Modelling Activities of Daily Living Using Local Interpretable Model-Agnostic Explanation Algorithm	117
<i>Henry Onyekwe, Idongesit Ekerete, Matias Garcia-Constantino, Chris Nugent</i>	
Sustainability, Ethics and Artificial Intelligence in Computing Education.....	123
<i>Samuel J. Moore, Paul McCullagh</i>	
Unsharp Mask Sharpening Detection Via Global Analysis	128
<i>Rong-Hui Lu, Tzong-Jer Chen, Junhong Pan</i>	
An Extended Design Framework of Antithetic Integral Feedback Controller for Restoring Disrupted Circadian Gene Profiles	132
<i>Joelle Tan, Mathias Foo</i>	
Pitch Response Comparison of Offshore Platforms: A Lagrangian Approach	138
<i>M. M. G. Costa, J. P. Santos, A. Bertolin, J. G. Silva, E. Nepomuceno</i>	
Efficient Approximate Checkerboard K-SVD for Resource Constrained Embedded Systems	144
<i>Yun Wu, John McAllister</i>	
Advancing Sleep Studies: An Exploration of Phase-Based Approaches for Sleep Staging.....	150
<i>Christopher McCausland, Pardis Biglarbeigi, Raymond Bond, Dewar Finlay</i>	
Investigation and Implementation of AI-HDLCoder for Automated VHDL Code Synthesis and Code Generation for Hardware SoC Development	156
<i>Vladyslav Romashchenko, Michael Brutscheck, Ingo Chmielewski</i>	
Cholecystectomy Surgical Instrument Detection Using Variants of YOLOv8	162
<i>Muhammad Adil Raja, Róisín Loughran, Fergal McCaffery</i>	
AI-Driven CHD Detection Using an Ultra-Low Power Embedded System.....	168
<i>Emma Carroll, Giuseppe Caracciolo, Sergi Gomez Quintana, Viktoriya Shelevytska, Andriy Temko, Emanuel Popovici</i>	
IoT-Based Liquefied Gas Tank Level Monitoring System for Industrial Welding Process	174
<i>Akseer Ali Mirani, Anshul Awasthi, Niall O'Mahony, Joseph Walsh</i>	
A Linearity Improved Equalizers for Short-Channel Communication Links	180
<i>Puneet Singh, Rahul Walia, Rajasekhar Nagulapalli, Mahendra Sakare</i>	
In-Vehicle Networks Security Using Transfer Learning Approach Against AI-Generated Cyberattacks	185
<i>Rahman Shafique, Furqan Rustam, Gyu Sang Choi, Sarath Kumar Posa, Anca Delia Jurcut</i>	

Modelling, Data Mapping, and Evaluation of Analog Multiply-And-Accumulate Components in Quantized CNNs.....	191
<i>Fergal Kilgannon, Sayan Kumar, Viet Nguyen, Teerachot Siriburanon, Robert Bogdan Staszewski</i>	
Trust Management for Cyber Physical Systems and IoT Networks: New Communications and Data Centric Model.....	197
<i>Kealan Mannix, Aengus Gorey, Donna O'Shea, Thomas Newe</i>	
Experimental Analysis of A-RoF Based Optical Communication System for 6G O-RAN Downlink	203
<i>Muhammad Usman Hadi, Muhammad Yunis Daha, Sunish Kumar Orappanpara Soman, Muhammad Ijaz</i>	
Authentication and Authorization in Zero Trust IoT: A Survey.....	209
<i>Meha James, Thomas Newe, Donna O'Shea, George D. O'Mahony</i>	
Combining Topological Signature with Text Embeddings: Multi-Modal Approach to Fake News Detection	216
<i>Rachel Lavery, Anna Jurek-Loughrey, Lu Bai</i>	
A Simplified Volterra Approach to Non-Linear ADC Post Correction.....	222
<i>David O'Leary, Haoyang Shen, Barry Cardiff</i>	
Assessing Factors Influencing the Reliability of Smart Insole Measurements.....	228
<i>Alastair Martin, Huiru Zheng</i>	
Smart Insoles-Based Gait Symmetry Detection for People with Lower-limb Amputation	234
<i>Luigi D'Arco, Haiying Wang, Carolyn Wilson, Ezio Preatoni, Elena Seminati, Grant Trewartha, Jill Cundell, Huiru Zheng</i>	
An RC-Based Dual Injection Locked Delay Cell for High-Frequency Ring VCOs.....	241
<i>Mayank Kumar Singh, Rajasekhar Nagulapalli, Devarshi Mrinal Das, Mahendra Sakare</i>	
An Investigation on Classical Methods and Unsupervised Deep Learning Algorithms for Image Segmentation in High Variance Images for Industrial Application	247
<i>Nathan Henry, Tamás Reiter</i>	
Management of Deep Learning Models for Oil Infrastructure Extraction from Remote Sensing Imagery.....	253
<i>Yuan Luo, Lu Bai, Zhibao Wang, Jinhua Tao, Qiang Ma, Anna Jurek-Loughrey</i>	
Spur Performance and Relative Implementation Costs of MASH and ENOP Digital $\Delta\Sigma$ Modulators	259
<i>Sanil Goyal, Michael Peter Kennedy</i>	
Algorithm Selection to Identify Brain Dominance Through Game-Based Learning. an Ethical Perspective.....	265
<i>Garry Gorman, Nigel McKelvey, James Connolly</i>	
Optimizing Machine Learning for ResourceConstrained Devices: A Comparative Analysis of Preprocessing Techniques and Machine Learning Algorithms.....	271
<i>Abdul Haseeb, Ian Cleland, Chris Nugent, James McLaughlin</i>	
Molecular Adversarial Generative Graph Network Model for Large-Scale Molecular Networks	276
<i>Mallikharjuna Rao Sakhamuri, Shagufta Henna, Leo Creedon, Kevin Meehan</i>	
Early Stopping Criteria for Training Generative Adversarial Networks in Biomedical Imaging	282
<i>Muhammad Muneeb Saad, Mubashir Husain Rehmani, Ruairi O'Reilly</i>	

Embedded DNN Classifier for Five Different Cardiac Diseases.....	289
<i>Muhammad Shakeel Akram, Bogaraju Sharatchandra Varma, Dewar Finlay</i>	
Behavior-Based Interpretable Trust Management for IoT Systems.....	295
<i>Muhammad Aaqib, Aftab Ali, Liming Chen, Omar Nibouche</i>	
Anechoic Demixing Under Phase Wraparound Conditions in Assisted Living Environments	301
<i>Swarnadeep Bagchi, Ruairi De Fréin</i>	
Green Machine Learning: Analysing the Energy Efficiency of Machine Learning Models.....	307
<i>Samara O. S. Santos, Agustina Skiariski, Daniel García-Núñez, Victor Lazzarini, Rafael De Andrade Moral, Edgar Galvan, André L. C. Ottoni, Erivelton Nepomuceno</i>	
Traffic-Specific Packet-Level Monitoring in SDN.....	313
<i>Fatemeh Amou Aghaei, Ruairi De Fréin</i>	
Learning Exemplar Representations in Single-Trial EEG Category Decoding	319
<i>Jack A. Kilgallen, Barak A. Pearlmutter, Jeffrey Mark Siskind</i>	
Microsimulation Modelling of Familial Hypercholesterolaemia Inheritance.....	325
<i>Christopher Page, Huiru Zheng, Haiying Wang, Steven Watterson, Taranjit Singh Rai, Maurice O'Kane, Shane McKee, Pádraig Hart</i>	
Enhancing Signal Detection in 6G Networks Through LSTM-Based MIMO Technology	331
<i>Bibin Babu, Muhammad Yunis Daha, Muhammad Usman Hadi</i>	
An Optimised Constant-Time Implementation of KASUMI FI Function	336
<i>Emma Urquhart, Desmond Chambers</i>	
An Entropy-Based Feature Selection Algorithm for Curve Detections and Parameterization in Grayscale Images	342
<i>Tamás Reiter, Michael McCann, Nathan Henry</i>	
Data Selection Tool for Analysis of Time Synchronised Sampled Values (TSSV) in Power Systems.....	348
<i>David Laverty, Erik Tridianto, Kieran McLaughlin</i>	
An Open-Source Quadcopter for Wind Field Surveying.....	354
<i>James Rainey, Naga Venkata Sai Chandra Mouli Gunturi, Nikolaos Athanasopoulos, Pantelis Sopasakis</i>	
Interpretable Machine-Learning for Predicting Molecular Weight of PLA Based on Artificial Bee Colony Optimization Algorithm and Adaptive Neurofuzzy Inference System	360
<i>Amir Pouya Masoumi, Leo Creedon, Ramen Ghosh, Nimra Munir, Ross McMorrow, Marion McAfee</i>	
LA-CNN: Load-Adjusted Video-on-Demand Prediction Using CNNs.....	366
<i>Kimeli Kangogo, Ruairi De Fréin</i>	
Speech Feature Fidelity from a Generative Auditory Transduction Model	372
<i>Cathal Ó Faoláin, Andrew Hines</i>	
A Novel Random Effect Based Simulation System for the Replication of Dairy Cattle Methane Emission Experiments	379
<i>Stephen Ross, Haiying Wang, Masoud Shirali, Tianhai Yan, Huiru Zheng</i>	
Random Forest Approach to Identifying Microbial Biomarkers Relating to COVID-19 Severity.....	385
<i>Jialin Lyu, Haiying Wang, Taranjit Singh Rai, Huiru Zheng</i>	

Adaptive Terminal Sliding Mode Disturbance Observer Augmented Backstepping Integral Sliding
Mode Control for Twin Rotor MIMO System..... 391
Sagar, Shubhi Purwar

One Active Element Based CMOS Compatible Voltage-Mode TOQSO..... 397
Atul Kumar, Bhartendu Chaturvedi, Shafali Jagga

Author Index