

# **2024 8th International Symposium on Innovative Approaches in Smart Technologies (ISAS 2024)**

**Istanbul, Turkiye  
6-7 December 2024**



**IEEE Catalog Number: CFP24JZ6-POD  
ISBN: 979-8-3315-4011-1**

**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:    | CFP24JZ6-POD      |
| ISBN (Print-On-Demand): | 979-8-3315-4011-1 |
| ISBN (Online):          | 979-8-3315-4010-4 |

**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



## 8<sup>th</sup> International Symposium on Innovative Approaches in Smart Technologies

December 6-7, 2024, İstanbul - Türkiye

### Table of Contents

|  |     |
|--|-----|
| Front Cover .....  | i   |
| Author Index .....   | v   |
|  |     |
| Efficient Estimation of Sigmoid and Tanh Activation Functions for Homomorphically Encrypted Data Using Artificial Neural Networks..... | 1   |
| Real-Time Detection of Bearing Faults in Induction Motor Using Edge AI and Piezo Microphone .....                                      | 8   |
| RAGNAR: Retrieval-Augmented Generation using Networked and Advanced Relational Data .....  | 15  |
| High-Accuracy Hand Segmentation for Palmprint Biometric Systems Improving Auto-Encoder Techniques .....                                | 21  |
| Aquila Optimizer-Based Filtered PID Controller Design For A Spark Ignition Engine Speed Control .....                                  | 25  |
| Optimizing CRM Platforms with Distributed Cloud Architectures for Scalable Performance and Security .....                              | 30  |
| Hybrid Deep Learning Model Based Advanced AI-Driven Identity and Access Management System for Enhanced Security and Efficiency .....   | 36  |
| Dual-Band Microstrip Antenna for GPS L1 and L2 Applications.....   | 40  |
| Multi-Task Learning on Mental Disorder Detection, Sentiment Analysis, and Emotion Detection using Social Media Posts.....              | 44  |
| Enhancing Document Security in Cloud Using Microsoft SEAL Encryption.....  | 54  |
| Enhancing Content-Based Image Retrieval with a Stacked Ensemble of Deep Learning Models.....   | 59  |
| A Possibility for Positional Step Control of Electric Drives with Wound Rotor Induction Motors .....                                   | 70  |
| E-Commerce Trust in Saudi Arabia: An Empirical Investigation Using A/B Testing .....   | 75  |
| Seamless Handovers in Software-Defined Vehicular Fog Networks .....  | 82  |
| A Novel Ensemble Learning Model Using CNNs And Vision Transformers for Waste Classification .....                                      | 90  |
| A Modulo ( $2^n - (2^k + 1)$ ) Adder Architecture for RNS-based Digital Signal Processing Applications.....                            | 97  |
| Harnessing CNNs and Decision Trees for Autonomous Scoliosis Diagnosis on Spinal Radiographs .....                                      | 105 |
| Optimizing Renewable Energy Utilization: A Study on Solar Radiation Forecasting with LSTM-Conv1D Models in Libya .....                 | 112 |
| Medical Image Analysis with Transformer Models: A Study on Vision Transformers for the COVID19 Classification of CT Chest Images.....  | 120 |
| Capacity Analysis of a Ridge Gap Waveguide at Millimeter Wave Regime for Future Communication Systems ...                              | 125 |



**8<sup>th</sup> International Symposium on Innovative Approaches in Smart Technologies**

**December 6-7, 2024, İstanbul - Türkiye**

|   |     |
|---|-----|
| Forecasting the Profit or Loss Status of Companies using Machine Learning .....   | 128 |
| End-to-end Automatic Music Transcription of Polyphonic Music Using Convolutional Neural Networks .....  | 133 |
| Symptom-Based Machine Learning Approach for Early COVID-19 Detection .....  | 138 |
| Bayesian Optimization of Passive RF Circuits .....  | 142 |
| TalkEasy: An Interactive Web-Based Platform for Hiragana Japanese Sign Language Fingerspelling Acquisition using K-Nearest Neighbors (KNN) Algorithm .....            | 148 |
| Gamification as a Tool for Enhancing University Students Campus Adaptation: The YUNIPeer Application .....  | 154 |
| A Soft Sensor Approach for Cookware Classification and Temperature Estimation in Smart Domestic Induction Hobs .....  | 159 |
| AI-Powered Intelligent Mindfulness-Based Cognitive Therapy Companion for Emotion Recognition and Context-Aware Therapy.....   | 165 |
| Performance Analysis of Deep Learning Models for Microstructure Image Classification of Carbon Steel .....  | 171 |
| Multi-Scale Self-Attention Convolutional Neural Network for Energy Storage State-of-Charge Estimation .....   | 178 |
| Environment, Social, Governance (ESG) Investment in Artificial Intelligent (AI) to Improve Power Grid focusing Peninsular Malaysia using System Dynamic .....         | 183 |
| Cardiovascular Disease Prediction using Machine Learning Methods.....   | 189 |
| Simulating Skydiving Experience in Virtual Reality .....  | 194 |
| Medical Image Encryption based on Tangent Transform-based Sine-Chebyshev Map .....  | 199 |
| Brain Tumor Segmentation in FLAIR MRI Images Using Deep Learning Techniques.....  | 206 |
| Smart Continuous Wearable Real Time Monitoring System for Human Health Care based on IoT .....  | 214 |
| Blockchain Based Wireless Networks: Technologies and Limitations .....  | 220 |
| Interpretation of White Box Adversarial Attacks on Machine Learning Model Using Grad-CAM.....   | 228 |
| Enhancing Sustainable Algal Growth and Biomass Conversion in Lebanon: Integrating Photo-bioreactors and Spray Dryer Systems .....                                     | 238 |
| An Adaptive Penalty Factor Approach for Cost-Emission Oriented Economic Dispatch Problem using Wild Horse Optimizer .....   | 246 |
| Hybrid Underwater Target Tracking with Particle Filters and Deep Learning: Focus on Design Considerations .....   | 252 |
| Safety of the Intended Functionality (SOTIF) based on System Theoretic Process Analysis (STPA): Study for Specific Control Action in Blind Spot Detection (BSD) ..... | 258 |
| Predicting Building Energy Consumption from Electricity Meters using Prophet: A Computational Study on Benchmark Data.....  | 263 |
| Radar-based Elderly Fall Detection Using Power Spectral Density Features Obtained by Different Methods .....  | 269 |



**8<sup>th</sup> International Symposium on Innovative Approaches in Smart Technologies**

**December 6-7, 2024, İstanbul - Türkiye**

|  |     |
|--|-----|
| Real-Time Crossroad Traffic Light Management.....  | 274 |
| Exploring Incremental Classifiers for Predicting Student Performance Across Semesters .....  | 280 |
| Battery Pack Temperature Change Prediction for Running BLDC 1500 W Motor using Artificial Neural Network   | 286 |
| Leveraging Large Language Models to Enhance Mental Health Literacy and Diversity Awareness in Adolescents:<br>The me_HeLi-D Project.....                                   | 291 |
| Feasibility of Emergency Steering Function for Semi-trailer Trucks in the Presence of Actuator Limitations .....   | 296 |
| Classification of Depression, Anxiety and Stress from Handwriting and Drawing with Stacking Models.....  | 303 |
| WGAN-Based Synthetic Data Generation for Modeling Cyberattacks in Power Transmission Systems .....   | 311 |
| Personalized Gamified Education: Feedback Mechanisms and Adaptive Learning Paths .....   | 316 |
| Evaluation Approach for the Impact of a Gamified University Environment .....  | 322 |
| Retrieval-Augmented Generation (RAG) and LLM Integration.....  | 328 |
| An Opportunity to Implement a Highly Efficient Battery Charging Process in an Autonomous and Grid-Connected<br>PV - System at a Self-Moving Robotic Platform Complex ..... | 333 |
| Optimizing Solar Energy Management using AI Based Systems.....   | 338 |
| Estimation of Optimal Time-to-Live Values for Mitigating Router Spoofing Attacks Utilizing Lasso and Ridge<br>Regression Machine Learning Techniques .....                 | 344 |
| Abnormal Activity Detection using CNNs with TimeDistributed Layers.....  | 350 |
| Smart Point-of-Care Application for Automated Wound Segmentation .....   | 354 |
| Distributed Decision-Making in Modular Drone Swarms .....  | 356 |
| Gossip Based Consensus Algorithm for Multi-Agent Systems .....   | 362 |
| IoT Earthquake Detection Using Localization and GSM Networks.....  | 369 |
| Di-AEFA: Diversified Artificial Electric Field Algorithm for Global Numerical Optimization.....  | 373 |
| Diagnosis of Epileptic seizures and Hypoxic-ischemic encephalopathy using Artificial Intelligence based on EEG<br>signal: A review .....                                   | 385 |
| PID-Based Pitch Angle Controller Scheme for PMSG-Based Wind Energy Conversion System.....  | 391 |
| An Integrated Hesitant Fuzzy-based SWOT Analysis for Industry 5.0 Technology Evaluation.....   | 396 |
| An analytical model for multi-criteria evaluation of IoT application layer protocols .....   | 402 |
| Crab Age Prediction using Machine Learning for Sustainable Crab Farming.....   | 407 |
| RE-LLaMA: Large Language Models for Hydrogen Deployment: A Domain-Specific Approach in Renewable<br>Energy .....   | 414 |
| Recognition of Human Actions through DDC Transform and Silhouettes .....   | 418 |
| Virtual Jewelry Experiences In The Jewelry Industry: A Review On Virtual And Augmented Reality Applications  | 424 |



**8<sup>th</sup> International Symposium on Innovative Approaches in Smart Technologies**

**December 6-7, 2024, İstanbul - Türkiye**

|  |     |
|--|-----|
| Corrugated Antipodal Vivaldi Antenna in a Matching Medium for Ultrawideband Breast Cancer Detection .....  | 428 |
| Steiner-Based Space Modulation Techniques: ABER Performance Under Spatial Correlation .....  | 432 |
| Integrating Reinforcement Learning into Pipe System Design.....  | 437 |
| Machine learning approach for particle kinetics modeling .....   | 443 |
| Equation tokenization for LLM data processing .....  | 448 |
| Methods of Multi-Threshold Decoders Use in Mimo Systems And Methods of Assessing Their Performance .....   | 452 |
| Comprehensive Vulnerability Analysis and Penetration Testing Approaches in Smart City Ecosystems .....   | 458 |
| A Novel Approach for Phobia Analysis Using EEG and ECG Physiological Signals and Artificial Intelligence(AI)<br>.....  | 464 |
| Development of a Conveyor Belt with a Computer Vision Module for Educational Purposes.....   | 468 |
| An Ensemble Learning Based Nuclei Segmentation: Using Base Deep Learning Models with Different Loss<br>Functions.....  | 473 |
| Smart Posture Monitoring and Predictive Health Classification for Bedridden Patients Using IoT and AI .....  | 479 |
| AI-Enhanced Techniques for Extracting Structured Data from Unstructured Public Procurement Documents .....   | 484 |
| Adaptive Conjugate Gradient Methods for Image Impulse Noise Removal .....  | 492 |
| An Enhanced Conjugate Gradient Algorithm for Solving Unconstrained Optimization and Image Restoration<br>Problems .....                                      | 497 |
| Hybrid Lossy Compression for Grayscale Images using Polynomial Coding, ISUQ and Soft Thresholding<br>Techniques .....  | 503 |
| Optimization of Energy Consumption in Compressed Air Systems with Green Transformation Strategies in Wheel<br>Manufacturing.....                             | 510 |
| The Cutting-Edge YOLO11 for Advanced Aircraft Detection in Synthetic Aperture Radar (SAR) Imagery .....  | 515 |
| Deep Learning In Military Object Detection: An Example of The Yolo-Nas Model.....  | 521 |
| Dual Band Rectifier Circuit Design for Wireless Power Transfer to IoT Devices .....  | 528 |
| Machine Learning Models for Power and Surface Temperature Values of Different Types of Photovoltaic Solar<br>Panels under Antarctic Climate Conditions ..... | 532 |
| Design and Optimization of a Prototype Automated Food Production Line: A Multi-Algorithm Approach.....   | 539 |
| Dynamic Codebook Design in Non-Coherent Short-Packet Communications Using Modulation on Conjugate-<br>Reciprocal Zeros .....                                 | 551 |
| Data-Secure Natural Language Interfaces to Databases via Large Language Models .....   | 557 |
| BINSIGHT: Waste Sorting Enhanced with Machine Learning and Reward System .....   | 563 |



**8<sup>th</sup> International Symposium on Innovative Approaches in Smart Technologies**

**December 6-7, 2024, İstanbul - Türkiye**

|   |     |
|---|-----|
| Innovative Development of Hybrid LSTM-CNN Architecture with Optimized Parameters for Enhanced Predictive Maintenance Performance.....                                       | 569 |
| Engagement and Effectiveness of HyFlex Learning: Insights from a Malaysian Private University .....   | 575 |
| CycleCraft: A Web-Based Platform for 3D Bike Customization, Training, and Community Engagement.....   | 582 |
| Eternal Wayfinder: AI-Powered Navigation for Efficient Routing in Cemeteries .....  | 587 |
| AI-Enhanced Cybersecurity in Fluid Dynamics Simulation Software .....   | 592 |
| Multimodal Deep Learning for Video Classification.....  | 600 |
| Optimal Elevators Control for Buildings Based on Associative Memory .....   | 608 |
| ElHa Net: A Pattern Recognition Neural Network .....  | 616 |
| IOT-Enabled Sensors And AI For Real-Time Monitoring of Fluid Systems .....  | 624 |
| Machine Learning Techniques for Turbulence Analysis and Simulation.....   | 630 |
| Developing 244 Terengganu Scenic Drive Using Augmented Reality for Sustainable Tourism and Community Well-Being.....  | 637 |
| Comparison of System Theoretic Process Analysis and Cause Tree Analysis Applied on an Autonomous Parking System from Safety of the Intended Functionality Perspective ..... | 645 |
| Autonomous Flight Systems and Generative AI.....  | N/A |