

2025 13th International Japan-Africa Conference on Electronics, Communications, and Computations (JAC-ECC 2025)

**Alexandria, Borg Al Arab, Egypt
15-17 December 2025**

IEEE Catalog Number:
ISBN:

CFP2504S-POD
979-8-3315-9108-3



Copyright © 2025, IEEE

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:	CFP2504S-POD
ISBN (Print-On-Demand):	979-8-3315-9108-3
ISBN (Online):	979-8-3315-9107-6
ISSN:	2376-4112

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

AraGraphSQL: Modeling Schema Knowledge with Heterogeneous Graph Transformers for Arabic Text-to-SQL Translation	1
<i>Aly H. Gouda, Zeina Eltannikhy, Ahmed B. Zaky</i>	
Context-Aware Translation of Egyptian Hieroglyphs via Symbol Segmentation, Classification, and Retrieval-Augmented LLMs	7
<i>Hesham A. Ebaid, Eyad Amgad, Zeyad Raslan, Ahmed Elkhoully, Khaled Behairy, Ahmed Fares</i>	
Physics-Informed Neural Networks for Human Activity Recognition: A Literature Review	13
<i>Ahmed R. Mokhtar, Ahmed Gomaa, Walid Gomaa</i>	
Parameter-Efficient Fine-Tuning of MedMAE for Multi-Task Medical Imaging	19
<i>Dina A. Elkholy, Islam Osman, Mohamed S. Shehata, John W. Braun</i>	
Intelligent Navigation and Collision Avoidance for Continuum Robots Using Deep Reinforcement Learning	25
<i>Motaz Elsaman, Mahmoud Abu-Alfadel, Haitham El-Hussieny</i>	
Influence of Pathological Biomarkers on the Geometry of Breast Cancer Tumor Subtypes	31
<i>Kyrillos Youssef, Ahmed H. Abd El-Malek, Haruichi Kanaya, Mohammed Abo-Zahhad</i>	
AI-Powered Real-Time Voice-Activated First Aid Guidance System Using Large Language Models	35
<i>Mohammed Abo-Zahhad, Farida M. Sharaf, Habiba Hafrag, Mostafa N. Zakaria, Yousef M. Amer May M. Ismaiel</i>	
GutCare: An AI-Powered Mobile App for Personalized Gastrointestinal Symptom Tracking and Comprehensive Trigger Identification	41
<i>Mohammed Abo-Zahhad, May M. Ismaiel, Mostafa N. Zakaria, Yousef M. Amer, Farida M. Sharaf Habiba Hafrag</i>	
Advances in FPGA-Based Continuous Glucose Monitoring Systems for Type 1 Diabetes: A Comprehensive Review	47
<i>Mennatallah Zain El Deen, Mohammed S. Sayed, Sameh Sherif, Haruichi Kanaya, Mohammed Abo-Zahhad</i>	
Frequency Response of Quadrature Hybrid Branchline Coupler	53
<i>Abdel Rahman Mohamad Sallam</i>	
Simulation of Shielded Rooms and Its Performance Evaluation for Protection Against LEMP	57
<i>Ahmed H. Metwally, Hassan M. Elkamchouchi, Noha Korany, Wael A. Moussa</i>	
Design of Efficient Analog Programmable Neurons for LowLatency AI/ML Computations	62
<i>Ibrahim E. Ibrahim, Mohammed Abo-Zahhad</i>	
A 0.2-1.25GHz High Efficiency Voltage Doubler for Supplying Biomedical Devices	68
<i>Marwa Mansour, Mohamed Aboulalaa, Islam Mansour</i>	
Algorithmic Restructuring for High-Efficiency GPU Acceleration of the Kvazaar HEVC Intra Encoder	72
<i>Reem Fawzy Mahmoud, Ibrahim Essam Ahmed, Seif Hytham Ahmed, Marawan Tarek Abdelhady Mohamed Mahmoud Emadeldin, Mohammed S. Sayed</i>	
Video-Driven Fault Classification of Rotating Machinery Using 3D CNNs	77
<i>Ismael Abbo, Mohamed Galal Nassef, Mohab Hossam, Walid Gomaa</i>	

Pose-Based Pedestrian Localization: A Comparative Study of Stereo and Monocular Depth Estimation	81
<i>Mohamed Gamal, Abdulrahman Badawy, Islam Elnabawy, Ahmed Goma</i>	
Integrating Explainable Artificial Intelligence and Machine Learning for Fertilizer Management in Smart Farms	86
<i>Mohammed Abo-Zahhad, Gehad Elkoumy</i>	
Robust GPR-Aided Localization for Autonomous Vehicles in GPS-Denied Environments	92
<i>Farag M. Bahr, Michael Stolz, Abdelgwad Elashry, Daniel Watzenig</i>	
A Comparative Study of Machine Learning Based Techniques for Plant Leaves Segmentation	97
<i>Amira Monir Kamal, Saleh M. Ismail, Mohamed Abbas, Shima A. Abdelrahman</i>	
Beyond Traditional Steganography: A Comparative Analysis of AI-Driven Techniques for Modern Data Security	101
<i>Ganna M. Elsayed, Yousef I. Goma, Nourhan Ramzy, Noran Mohamed, Ahmed H. Arafa</i>	
Spider IoT-Based Wearable Remote Health Monitoring System Using Machine Learning	106
<i>Abdelrhman A. Kafsheen, Abdulrahman Mahmoud, Ahmed M. Qasem, Ahmed S. Sweffi Marawan M. F. Abdelbaset, Adel B. Abdel-Rahman, Moataz Abdelwahab, Sameh Shreif</i>	
Unified p-Norm Detection and Hybrid Fusion for Mobility-Robust CSS in Dynamic Clustered 5G NR Vehicular Networks	112
<i>Kenneth Okello, Elijah Mwangi, Ahmed H. Abd El-Malek</i>	
Toward 6G: UAV-THz Networks Optimized with MCFO Algorithm	118
<i>Rana M. Mokhtar, Korany R. Mahmoud, Heba M. Abdel-Atty</i>	
Performance of RSS-Guided Terminal Selection for Enhanced User-Cooperative Indoor Positioning	124
<i>Zhuoran Li, Osamu Muta, Yutaka Jitsumatsu</i>	
Optimizing the Complexity-Performance Tradeoff in Deep Learning Wireless Autoencoder Architectures	129
<i>Mohammed Abo-Zahhad, Eman Ismail, Abdelhay Ali, Osama O Elnahas</i>	
A Two-Component Propagation Model for Multi-Floor Buildings Incorporating Floor-Transmitted and Wall-Reflected Paths	135
<i>Jiaxu Liang, Zhuoran Li, Osamu Muta</i>	
Design and Implementation of a LoRa Modulator on FPGA	139
<i>Amera Sharkawy, Omayma Elshazly, Mostafa S. Nada, Nada Mohamed, Ahd Hesham, Maha Elsabrouty Sameh Sherif</i>	
Benchmarking NLP Paradigms for Livestream Transcript Highlight Detection	145
<i>Muhammad Umar Farzan, Dev Nareshkumar Aswani, Abdul Rehman Ikram</i>	
Failing Forward: How Analyzing Mistakes Creates More Efficient and Robust AI Theorem Provers	150
<i>Ahmed Sleem, Nihal Ahmed Adly, Gamila S. Elfayoumi, Ahmed B. Zaky</i>	
Multi-Scale Fusion of Sentence- and Character-Level Features for Automated Dyslexia Detection	154
<i>Moustafa Rezk, Ezz Eldin Saraya, Yassin Mahmoud, Hager Tawfik, Ahmed Medhat, Shahd Mohame Hossam Kasem</i>	

Psychoacoustic-Aware Generative Adversarial Network for Realistic and Intelligible Speech Enhancement	160
<i>Steven Yakoub, Anas Awadallah, Mostafa Mahdy, Youssef Elkady, Hossam Kasem</i>	
High-Performance Sprite Rotation Hardware with Overlapped Memory Buffering on FPGA	166
<i>Keigo Aoki, Akira Yamawaki</i>	
Development of a Motion Detection System Using Average-Based Dynamic Background Subtraction Hardware	170
<i>Takahiko Koga, Akira Yamawaki</i>	
Study of organic solar cell performance with variations of different parameters	174
<i>Mostafa M. Salah, Eyad Hany, Marwan Alaa, Youssef Farid, Ahmed Saeed, Mohamed Mousa</i>	
A Verification and Performance Evaluation Framework for RISC-V Vector Kernels	178
<i>Omar Mahmoud, Khaled Gad, Sally R. Zeineldeen, Mohammed Moawad, Yousif Masoud, Ebrahim Osama Ali Elsayy, Youssef M. Fathy, Shaimaa Elsayed, Rami Zewail, Mohammed S. Sayed</i>	
Toward Efficient and Low-Cost Solution for Data Collection and Control for IoT	182
<i>Emad Badry</i>	
Ankle Spasticity Rehabilitation System for Patients with Neurological Disorders	187
<i>Neven Saleh, Yomna K. Elkhamisy, Akmal Ali, Adham Sherif, Ahmed M. Salaheldin</i>	
An End-to-End sEMG-Driven Prosthetic Hand System: From Signal Acquisition to Real-Time Actuation	192
<i>Ahmed Omar, Mohamed Abbas, Khalil Yousef, Kasem Khalil</i>	
Design and Implementation of a High-Precision Small-Signal Detection System for Microfluidic Biosensing Applications Using Integrated Excitation and Signal Control Architecture	198
<i>Mariam Mohsen, Hanin Hossam, Mennatallah Alaa, Yehea Ismail, Yehya H. Ghallab, Sameh Sherif</i>	
EEG Spectrogram Augmentation Using Transformer and Quantum-Inspired Generative Models for Epilepsy Classification	204
<i>Ahmed A. Elshamy, Heba A. Metwaly, Mohamed I. Eldagla, Zyad AlKayem, Ahmed B. Zaky</i>	
A Systematic Framework for Evaluating the Diagnostic Impact of Super-Resolution Models in Medical Imaging	208
<i>Assem Saied ElQersh, Amr Ebrahim Elsayed, Mark William, Zeyad Mohamed Aboualsadat Salma Amin Nouredin, Youssef Wael Elmadawy, Hossam Kasem</i>	
Bridging Tabular Learning and Natural Language Understanding through Tree-Based Semantic Encoding	214
<i>Ahmed Sleem, Nihal Ahmed Adly, Gamila S. Elfayoumi, Ahmed B. Zaky</i>	
EgMM-Corpus: A Multimodal Vision-Language Dataset for Egyptian Culture	218
<i>Mohamed Gamil, Abdelrahman Elsayed, Abdelrahman Lila, Ahmed Gad, Hesham Abdelgawad Mohamed Aref, Ahmed Fares</i>	
Stacked Ensemble of Pretrained Base Models with Hyperparameter Optimization: Logistic Regression vs. LightGBM Meta-Learner Performance	223
<i>Basmla Taha, Noreen Tamer, Eman Elhalawany, Kareem Ali, Mohamed Issa</i>	
Evaluating Large Language Models for Arabic Text-to-SQL	227
<i>Salma A. Alashry, El-Sayed M.E. Mostafa, Ahmed B. Zaky</i>	

Descriptive Simulation of Glucose Concentration Sensing Integrating an Adaptive Model for Meal-Triggered Insulin Infusion	232
<i>Mennatallah Zain El Deen, Mohammed S. Sayed, Sameh Sherif, Haruichi Kanaya, Mohammed Abo-Zahhad</i>	
A Hybrid Learning Approach for Detection of Autism Spectrum Disorder Using fMRI Data	238
<i>Mennahtullah Mabrouk, Reem Reda, Hana Hisham, Abdelrahman Hazem, Bola Hosny, Hossam Elsawaf Saif Elaswad, Sameh Sherif</i>	
Identifying Schizophrenia Using fMRI With a Deep Learning Algorithm	243
<i>Abdelrahman Hazem, Reem Reda, Hana Hisham, Mennahtullah Mabrouk, Bola Hosny, Hossam Elsawaf Saif Elaswad, Sameh Sherif</i>	
Design of a Smart Bed Incorporating Conventional Movements and Novel Positioning for Vital Monitoring and Pressure Ulcer Prevention	249
<i>Yomna Osama, Rowan Abdelrahman, Sameh Sherif</i>	
Monocular Metric Depth Estimation in Traffic Scenes: A Comparative Study across DAIR-V2X-I, TUMTraf-V2X-R2, and DDAD	255
<i>Youssra Elqattan, Karim Ismail, M. Watheq El-Kharashi, Ahmed Osama</i>	
Efficient LSTM and RF Models for Network Intrusion Detection	261
<i>Saeed Mohsen, Ahmed M. Abbas, M. Mokhtar Zayed, Sarah Oraby, M. Abdel-Aziz</i>	
Leveraging Gait Energy Images for Effective Human Action Recognition: Insights from Deep Learning and Few-Shot Learning	267
<i>Mahmoud Taha, Ahmed R. Mokhtar, Walid Gomaa</i>	
Parameter-Efficient Fine-Tuning of Whisper for Multi-Dialectal Arabic ASR	273
<i>Zyad Omar, Ahmed Abdelazim, Mohamed Gomaa, Kareem Ali, Amr Jamal, Ahmed Fares</i>	
A Virtual Reality Classroom Framework Integrating Generative AI for Immersive & Inclusive Education	277
<i>Yousef I. Gomaa, Marwan T. Hanafy, Mai Y. Ouf, Ahmed B. Zaky</i>	
Ranking Based Beam Training for XLRIS	282
<i>Ahmed M. Nor, Seyed Salar Sefati, Abdelrhman Y. Soliman</i>	
Robust State Estimation in Digital Twin-Integrated MEC Systems via Kalman Filters	286
<i>Yossef H. Mohamed, Ahmed M. Abdelhaleem, Ibrahim I. Ibrahim, Mostafa M. Abdelhakam</i>	
Implementation of MIMO Digital Beamforming System in Sub-6 GHz Band for 5G	292
<i>Ahmed Y. Hafez, Raafat T. Abdelnaby, Ali M. Mabrouk, Abdelrhman Mosaad, Saif M. Elnagar Ahmed H. Abd El-Malek, Mohammed S. Sayed</i>	
A BERT-CRF Framework for Enhanced Data Leakage Prevention in Unstructured Text	298
<i>Marwan Sobih, Mina Ramsis, Karim Sarhan, Jana Yasser, Ahmed Gomaa</i>	
An Integrated Deep Learning Framework for Automated Monitoring of Student Engagement and Emotional States in Educational Environments	303
<i>Abdelrahman Mohamed, Kareem Tarek, Mark Eskander, Jana Emad, Razan Kenawy, Nour Wassim Hossam Kasem</i>	
Model Predictive Control of Soft Continuum Robots for Manipulation Tasks	309
<i>Mostafa Boghdady, Ali Shiha, Abdelrahman Hisham, Mohamed El-Nahas, Omar Helal Haitham El-Hussieny</i>	

RAG-Grounded Technical Interview Question Generation with T5: Dataset Curation, Comparative Study, and Production Deployment	315
<i>Nada Goma, Menna Rasslan, Muhammad Ghareeb, Zeyad Moussa, Ahmed Farouk, Aliaa Hamad Ahmed Goma</i>	
Evaluating Large Language Models for Arabic Aspect Sentiment Triplet Extraction using Zero, One, and Few-Shot Prompting	319
<i>Rowan Nour, Sohaila Abdalgwad, Menna Noseer, Aliaa Abobakr, Abdelrahman Galhom, Ahmed Fares</i>	
Addressing Anomaly Detection and Concept Drift in Non-Stationary IoT Environments with an Uncertainty-Aware Deep Generative Model	323
<i>Noor El-Deen M. Mohamed, Medhat Awdalla, Hossam I. Ali, Ahmed Soliman</i>	