

2023 IEEE 13th International Conference on Electronics and Information Technologies (ELIT 2023)

**Lviv, Ukraine
26-28 September 2023**



**IEEE Catalog Number: CFP23LIT-POD
ISBN: 979-8-3503-8310-2**

**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:	CFP23LIT-POD
ISBN (Print-On-Demand):	979-8-3503-8310-2
ISBN (Online):	979-8-3503-8309-6

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

Attribute Selection, Outliers Impact Study and Visualization within Breast Cancer Detection <i>Gennady Chuiko, Olga Dvornik, Yeugen Darnapuk, Denis Honcharov, Yaroslav Krainyuk, Olga Yaremchuk</i>	1
Machine Learning Methods for Predicting Parkinson's Disease Progression <i>Yana Teletska, Vira Trofymenko, Oleh Vietrov, Artem Baiev</i>	6
Real-time Classification, Localization and Tracking System (Based on Rhythmic Gymnastics) <i>Anastasiia Neskorođieva, Maksym Strutovskiy, Artem Baiev, Oleh Vietrov</i>	11
Features of Using the Prophet Package for Forecasting the Local Weather Situation <i>Yuriy Korchak, Bohdan Ivashko, Yuriy Furgala</i>	17
Detection of Surface Defects Inside Concrete Pipelines Using Trained Model on JetRacer Kit <i>Roman Mysiuk, Volodymyr Yuzevych, Iryna Mysiuk, Yuriy Tyrkalo, Anatolii Pavlenchuk, Volodymyr Dalyk</i>	21
Application of Neural Networks for Processing Information in Redundant Rate Gyroscopes <i>Olha Sushchenko, Yurii Bezkorovainyi, Volodymyr Golitsyn</i>	25
Optimization Problems on Complex Networks: Method of Gravitational Potentials <i>Yuriy Golovaty, Oleksa Hryniv</i>	31
SIR Models on Complex Networks and Impact of Vaccination <i>Khrystyna Buhrii, Yuriy Golovaty</i>	37
Optimizing Neural Network Wavefunctions Using Variational Monte Carlo with Evolution Strategies <i>Mykhailo Moroz, Oleg Bovgyra</i>	43
The Influence of the Input Array on the Learning Error of a Multilayer Neural Network <i>Serhiy Sveleba, Ivan Katerynychuk, Ivan Kunyo, Natalia Sveleba, Ostap Semotiuk, Volodymyr Kotsun</i>	47
The Influence of Sampling Parameters on the Learning Error of a Multilayer Neural Network <i>Serhiy Sveleba, Ivan Katerynychuk, Ivan Kunyo, Natalia Sveleba, Serhiy Velhosh, Volodymyr Kotsun</i>	51
Vector Ant Algorithm <i>Fedir Abramov, Vitaliy Serzhanov, Natalia Reshetniak, Vladimir Zaiats, Nataliia Volosnikova, Olga Andreieva</i>	55
Increasing the Efficiency of Robot Swarm Navigation with the Help of Virtual Pheromone Direction Labels <i>Fedir Abramov, Vitaliy Serzhanov, Oleksandr Andreiev, Olga Andreieva, Tetiana Diachenko, Iana Maksymenko</i>	61
Modified Genetic Algorithm with Enhanced Gene Correction for Optimal Class Scheduling in Higher Education Institutions <i>Oleh Zanevych</i>	67
Processing Sensor Signal Under Low Values of Signal to Noise Ratio <i>Zinovii Liubun, Bohdan Bryk, Vasyl Mandziy, Oleksandr Karpin, Bogdana Kalivoshka, Serhiy Velhosh</i>	73

Automating Web Scraping of User Comments for Sentiment Analysis in Social Networks <i>Iryna Mysiuk, Roman Shuvar</i>	77
Crowdfunding in Ukraine: Problems and Prospects for the Development of an Alternative Way of Financing Science <i>Nadiia Petrenko, Olena Vovchenko</i>	82
Modeling of Bank Performance Indicators Based on Business Intelligence and Data Analysis <i>Liudmyla Koliechkina, Tetiana Hudz, Vadym Kylnyk</i>	87
Modeling the Dynamics of the EU Stock Indices Based on the Analysis of Structural Market Data <i>Anastasiia Shenderova, Sergiy Yakubovskiy</i>	93
Density-Based Outlier Detection: Supervised Approach based on Virtual Points <i>Olena Domanska, Valerii Martysyshyn, Oleh Buhrii</i>	97
Continuous Time Neural Network <i>Ihor Kutsevol, Oleh Buhrii</i>	102
Modification of Combined Unsupervised-Supervised Cascade Scheme for Small Biomedical Data Classification <i>Ivan Izonin, Roman Tkachenko, Marian Sydor, Stephane Chretien, Iryna Pliss, Taras Vovk</i>	107
Intelligent Expert Systems Application for Structuring Educational Materials to Enhance the Quality of Learning Outcomes <i>Alla Ivanyshyn, Tetiana Zahorodniuk, Valentyna Maliarenko, Bohdan Sus, Sergiy Zagorodnyuk, Oleksandr Bauzha, Oksana Boyko</i>	113
Goal-Driving Control as a Base Model of the Feeling Artificial Intelligence <i>Anatolii Kargin, Tetyana Petrenko</i>	118
Development of a Ray Tracing Framework for Simulating Acoustic Waves Propagation Enhanced By Neural Networks <i>Oleksandr Terletsnyi, Petro Venherskyi, Valeriy Trushevskiy, Ostap Hrytsyshyn</i>	124
Smoothed Particle Hydrodynamics. Implementation Using Compute Shaders <i>Ostap Hrytsyshyn, Petro Venherskyi, Valeriy Trushevskiy, Oleksandr Terletsnyi</i>	127
Machine Learning as One of the Highly Effective Methods of Reducing the Load on CSOC's Analysts <i>Roman Karpiuk, Petro Venherskyi, Anna Korchenko, Yuliia Khokhlachova</i>	132
Risks' Attribute Values Evaluation in Software Engineering by Monte Carlo Simulation <i>Maria Lyashkevych, Vasyl Lyashkevych, Roman Shuvar</i>	137
Gaussian Mixture Model Based Machine Learning Approach for Detection of Threat Types in Communication Networks <i>Oleksii Holubnychyi, Maksym Zaliskyi, Oleksandr Solomentsev, Ivan Ostroumov, Yuliya Averyanova, Olha Sushchenko</i>	142
Unsupervised Detection of Anomalous Running Patterns Using Cluster Analysis <i>Ivan Ursul, Andriy Pereymybid</i>	148
Nvidia Jetson NanoPlatform Using for Accelerating Image Recognition <i>Dmytro Myronyuk, Bohdan Blagitko</i>	153

Machine Learning Assistive State of Charge Estimation of Li-Ion Battery <i>Saeed Mian Qaisar, Ahd Alboody, Shahad Aldossary, Alhanoof Alhamdan, Nouf Moahammad, Abdulaziz Turki Almaktoom</i>	157
Hybridization of Empirical Mode Decomposition and Machine Learning for Categorization of Cardiac Diseases <i>Danah Milyani, Nouf Mohammad, Rim Slama, Saeed Mian Qaisar, Alhanoof Alhamdan, Nora Hamour</i>	162
Artificial Intelligence Assistive Fire Detection and Seeing the Invisible Through Smoke Using Hyperspectral and Multi-spectral Images <i>Ahd Alboody, Saeed Mian Qaisar, Gilles Roussel</i>	167
Performance Analysis of Database Access: Comparison of Direct Connection, ORM, REST API and GraphQL Approaches <i>Yaroslav Marchuk, Ivan Dyyak, Ihor Makar</i>	174
Augmentation in a Binary Text Classification Task <i>Bohdan Pavlyshenko, Mykola Stasiuk</i>	177
Development of a Virtual Cloud-based Traffic Rules Learning Simulator Using Spherical Video Streams <i>Artem Kazarian, Vasyl Teslyuk</i>	181
An Investigation into the Efficiency of Specific Databases for Tracking Purposes in Scope of IT Startup <i>Volodymyr A. Franiv, Oleksandr R. Biletskyi, Sofiya V. Vasylyuk, Ihor A. Franiv</i>	186
Comparative Study of ABC and GWO Implementations on Raspberry Pi 3 <i>Oleh Sinkevych, Yaroslav Boyko, Bohdan Sokolovskii, Igor Olenych, Liubomyr Monastyrskii, Mykhailo Pavlyk</i>	191
Implementation of Base Components of Neuro-like Cryptographic Data Protection Systems on FPGA <i>Ivan Tsmots, Roman Tkachenko, Vasyl Teslyuk, Vasyl Rabyk, Yurii Opotyak</i>	196
An Approach for Automated Code Deployment between Multiple Node.js Microservices <i>Oleh Chaplia, Halyna Klym</i>	202
Identity Verification and Detection System through Facial Recognition Technology <i>Nazar Karpiuk, Halyna Klym</i>	206
Approaching Quantum Utility by Leveraging Quantum Software Stack <i>Markiiian Tsymbalista, Mykola Maksymenko, Ihor Katernyak</i>	210
Application of a Partitioned Nonlinear Controller for Crane Lifting Operations in Manufacturing <i>William R. Longhurst, Randall D. Shelton, Bryan Gaither</i>	216
Pitch and Heading Angles Estimation by Airplane Trajectory Data Available in ADS-B <i>Ivan Ostroumov</i>	222
Performance Analysis of Compact Position Report for Geodata Storing and Transferring <i>Ivan Ostroumov, Olha Sushchenko, Yuliya Averyanova, Maksym Zaliskyi, Oleksandr Solomentsev, Oleksii Holubnychyi</i>	227

Algorithm for Selecting a Surface Model for Remote Sensing of Earth's Surfaces <i>Kseniia Nezhalska, Valery Volosyuk, Oleksandr Mazurenko, Konstantin Belousov, Semen Zhyla</i>	232
Analysis of Brightness Temperature Models for Describing Surfaces by Passive Remote Sensing Methods <i>Kseniia Nezhalska, Oleksandr Mazurenko, Konstantin Belousov</i>	237
Application of Geoinformation Technologies for Modeling the Movement of Water in the River Network of the Selected Area <i>Yaryna Kokovska, Mykola Prytula, Mykhailo Oleksyn</i>	242
Noise-immune Transfer of Decimal Data with Protection Based on Permutations <i>Oleksiy A. Borysenko, Oleksii Y. Horiachev, Olga V. Berezhna, Svitlana M. Matsenko, Anatolii I. Novhorodtsev</i>	248
Analysis of the Periodically Non-stationary Structure for Modulated Vibration Signal <i>Ihor Javorskyj, Roman Yuzefovych, Oleh Lychak, Pavlo Semenov, Mykola Varyvoda</i>	252
The Accuracy of Speech Transmission Index Estimation under Conditions of Joint Action of Noise and Reverberation <i>Arkadiy Prodeus, Oleksandr Dvornyk, Anton Naida, Maryna Didkovska</i>	257
The Impact of Parameters on the Efficiency of Keypoints Detection and Description <i>Andriy Fesiuk, Yuriy Furgala</i>	261
Identification of Internal Planar Square Defects in Composite Panels Using Optoacoustic Technique <i>Leonid Muravsky, Zinoviy Nazarchuk, Oleksandr Kuts, Oleksiy Sharabura</i>	265
Bluetooth Low-Energy Beacon Resistance to Jamming Attack <i>Volodymyr Sokolov, Pavlo Skladannyi, Volodymyr Astapenya</i>	270
Measuring Complex for Determination of Temperature Characteristics of Thermistors <i>Oleksandr Andreiev, Olga Andreieva, Fedir Abramov</i>	275
Development and Certification of ECG-pulsometric Device <i>Tetiana Ryzhenko, Maksym Mudrenko, Vitalii Budnyk, Mykola Budnyk, Victor Dehtiaruk, Mykola Dordiienko</i>	279
Development of 9-channel Magnetocardiograph CARDIOMOX MCG-9 <i>Vitalii Budnyk, Mykola Budnyk, Volodymyr Sosnytskyi, Xie Feng, Tao Miao, Shouzhong Zhu, Pavlo Sutkovyi, Yurii Minov, Pavlo Spylovyy, Maksym Mudrenko, Yevhenii Melnyk, Wenming Ji</i>	283
Software development for Magnetocardiograph CARDIOMOX MCG-9 <i>Vitalii Budnyk, Mykola Budnyk, Xie Feng, Yurii Frolov, Pavlo Sutkovyi, Yevhenii Udovychenko</i>	289
Study of the Morphology of Macroporous Silicon Obtained by Metal-Assisted Etching Using Chromium <i>Mykola S. Kukurudziak</i>	296

Degradation of Silicon Resistivity During Thermal Operations in <i>p-i-n</i> Photodiodes Technology <i>Mykola S. Kukurudziak</i>	301
Defect Formation on the Surface of Silicon Substrates After Various Technological Operations <i>Mykola S. Kukurudziak, Volodymyr M. Lipka, Olha P. Andreeva</i>	306
Sensors Sensitive Element for Refractive Index Measuring Based on Dielectric Grating on a Metal Substrate <i>Volodymyr Fitio, Iryna Yaremchuk, Tetiana Bulavinets</i>	311
Porous Layers as a Buffer for Synthesizing CdO/por-CdS/CdS Heterostructures <i>Yana Suchikova, Sergii Kovachov, Zhakyp Karipbaev, Ihor Bohdanov, Anastasiia Lysak, Anatoli I. Popov</i>	315
Optical Resonances and Enhancement of the Electric Fields in the Gap Between Two Spherical Metallic Nanoparticles <i>Andrii Korotun, Garry Moroz, Roman Korolkov, Igor Titov</i>	320
Influence of Preparation Conditions on Structure and Properties of Composites Based on Polyethylene Oxide and Clay Nanoparticles <i>Eduard Lysenkov, Sergiy Bilyi, Stanislav Nesin, Valeriy Klepko</i>	325
Structural Features of Porous-GaAs and its Potential in Heterostructural Buffer Layers <i>Yana Suchikova, Sergii Kovachov, Zhakyp Karipbaev, Ihor Bohdanov, Anastasiia Lysak, Anatoli I. Popov</i>	330
Optimization of Cd _x Te _y O _z Synthesis Modes by the SILAR Method <i>Yana Suchikova, Sergii Kovachov, Zhakyp Karipbaev, Yaroslav Zhydachevskyy, Ihor Bohdanov, Anatoli I. Popov</i>	335
Modeling of Ion Transfer Processes in CsPbBr ₃ Crystals <i>Ihor Kayun, Roman Lys, Yuriy Tymkiv</i>	340
Enhanced Nanostructure Evolution in Functional Spinel Ceramics through Additional Phases <i>Halyna Klym, Yuriy Kostiv, Ivan Hadzaman, Ivan Karbovnyk, Oleksii Kushnir</i>	344