

2025 XXVIII International Conference on Soft Computing and Measurements (SCM 2025)

**Saint Petersburg, Russia
28-30 May 2025**



**IEEE Catalog Number: CFP25C43-POD
ISBN: 979-8-3315-2668-9**

**Copyright © 2025 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:	CFP25C43-POD
ISBN (Print-On-Demand):	979-8-3315-2668-9
ISBN (Online):	979-8-3315-2667-2

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

Content SCM-2025

1. GENERAL MEASUREMENT THEORY. METROLOGY, MEASURES AND SCALES. UNCERTAINTY IN MEASUREMENTS

<i>Developing Multimodular Technologies and Systems Based on a Regularizing Bayesian Approach. Methodological Aspects of Integration in Multi-module Systems</i> S. V. Prokopchina	3
<i>On the Estimation of TSP Distribution Parameters based on Experimental Data</i> Aleksandr V. Stepanov, Anna G. Chunovkina	6
<i>Intelligent Data Processing for Automated Calibration of Analog Pointer Measuring Instruments using Machine Vision</i> A. Petrov	10
<i>Metrological Synthesis of a Power Measurement Channel</i> Vasilisa A. Baronova, Natalia V. Romantsova	14
<i>Development of an Automatic System for Monitoring the Meniscus of Liquid in Capillary Viscometers using a Video Camera</i> A. V. Mirgorodskaya	18
<i>Comparative Analysis of K-RLE and LTC Methods for Measurement Data Compression with Losses Control</i> Konstantin Semenov, Adele Raimzhanova	21
<i>Applications of Nanophysics in Renewable Energy</i> Hyder Subhi Faisal, Hafsa Taha Ahmed, Rayan Thabet Noman	25
<i>Analysis of Output Parameter Control Methods for Static Converters in Railway Rolling Stock</i> Nikita Tretiakov, Vladimir Kuznetsov, Pavel Rene	32

2. PROBABILISTIC METHODS IN INFORMATION PROCESSING. THE BAYESIAN APPROACH

<i>Tendencies of Dependencies between Psychometric Tests Results and Holland Code among VK Users</i> Egor Glushkov, Valerie Stoliarova	36
<i>Approaches to Hyperparameter Tuning in the Task of Avatars Clustering in Online Social Media</i> Ilya Prusskikh, Valerie Stoliarova, Fedor Bushmelev	39
<i>Algebraic Bayesian Networks: Using the Canonical Representation of the Knowledge Pattern in Local Inference</i> V. E. Loskutov, A. A. Vyatkin	43
<i>Hyperparameter Selection Methods for Machine Learning Models for Predicting Big Five Test</i> Olga R. Gavrilenko, Valerii D. Oliseenko, Tatiana V. Tulupyeva	47
<i>Development of a Prototype Software Platform for Modeling and Forecasting the Performance of Complex Systems</i> Roman A. Zhukov, Nadezhda O. Kozlova, Sergey A. Morozuk, Nikita A. Zimin	51

3. SYSTEMS SIMULATION. COMPLEX OBJECTS CONTROL UNDER UNCERTAINTY

<i>Design of Control Algorithms Based on Fuzzy Logic Apparatus</i> Liudmila P. Kozlova, Olga A. Kozlova	54
<i>Robust Hierarchical Sliding Mode Control of a Complex Nonlinear Electromechanical Object under Uncertainty and Unknown External Disturbances</i> Duy Khanh Nguyen, Viktor N. Sheludko, Viktor V. Putov, Tatyana L. Rusyaeva	58
<i>Control of a Permanent Magnet Synchronous Motor with a Guarantee for the Controlled Signal to Stay within a Given Set</i> I. R. Gogorev, P. V. Sokolov	62
<i>Application of PID-regulator with Neural Network in the Control System of Exoskeleton Electric Drive</i> Liudmila P. Kozlova, Olga A. Kozlova	66
<i>Selection of Core Parameters to Reduce the Influence of an External Magnetic Field</i> Artem A. Geleta, Ekaterina N. Zhdanova, Elena S. Suloeva	70
<i>Application of Neural Networks in the Control System of Electric Drives of Drying Sections in a Paper Machine</i> A. M. Belov, M. P. Belov	74
<i>Development of a Simulator for Generating Synthetic Data to Train Neural Networks under Uncertainty</i> V. V. Kovalev, A. A. Korneeva, A. O. Fedorkova, E. A. Maslennikova, D. M. Filatov, D. P. Mikhailov	78
<i>Control System of Static Reactive Power Compensator using Blondel Transform for Line Voltages</i> Artem Prokshin, Nayaga Pend Wende Jedron Moise, Nikolay Tatarintsev, Alexander Pozhidaev, Alexander Trofimov, Gennady Karpov	81
<i>Development of Intelligent Information Technology for Assessing the Time Horizon of Critical Changes in the State of an Object during Climate Change</i> Karina V. Martirosyan, Angelika O. Kovaleva, Alexander B. Chernyshev, Valentina V. Tcapleva	85
<i>Numerical Simulation of Quadrature Chaos Phase-Shift Keying Communication System in LabVIEW</i> Alexandr Makarov, Ivan Babkin, Georgy Kolev, Oleg Bayazitov, Maksim Galchenko, Ekaterina Kopets	89

<i>Application of Synergetic Control to Lotka–Volterra Equations for Aquatic Ecosystem Management</i> E. G. Kostrygina, M. D. Polyak	93
<i>Analyze the Control System of an Aviation Electric Fuel Pump</i> Thang Duy Nguyen	97
<i>Development of Robot Assistant Prototype for Delivery of Repair Kits and Chemical Reagents in the Electrical Installation Workshop</i> A. V. Lavrenov, I. M. Novozhilov	101
<i>Designing an Electronic Plant Growing System in an Isolated Environment</i> A. N. Ilyushina, I. M. Novozhilov	105
<i>Modeling of Underground Ore Bodies based on Tin-ten Technology</i> L. G. Musta, D. A. Novak, Yu. N. Kozhubaev, H. Cheng	110
<i>Verification of Electrical and Geometric Models Using Graph Isomorphism Checking Algorithms</i> A. S. Varfolomeev, A. V. Lepov, S. E. Mironov	118
<i>Optimization of IC Cell Routing in Conditions of Uncertainty</i> P. M. Shiryaev, S. E. Mironov	123
<i>The Method of Forming Decentralized Geoinformation Models</i> Galina V. Verkhova, Sergei V. Akimov	127
<i>Multi-criteria Assessment of renewable Energy Sources Involvement in the Regional Energy System based on the Hierarchy Analysis Method</i> Victoria V. Buchatskaya, Pavel Yu. Buchatskiy, Semen V. Teploukhov, Stefan V. Onishchenko	131

4. NEUROCOMPUTING NETWORKS AND NEUROTECHNOLOGIES

<i>Development and Optimization of a Semantic Search System for Scanned Legal Documents</i> Mikhail V. Alekseyuk, Anton A. Shaburov, Dmitry A. Tereshkin, Maria Yu. Ushankova	136
<i>Multi-Structure Segmentation in CBCT Volumes</i> Elizaveta Shemet, Aleksandr Sinitca	140
<i>Graph Construction Approaches for Graph Neural Networks-based Anomaly Detection in Time Series</i> Nunna Joseph Mlyahilu, Evgenia Novikova	144
<i>Algorithm for Noise Supression in Biological Neuron Signal that Preserves Pulse Amplitude</i> Karina Kurtova, Valeriy Ostrovskiy, Georgiy Kolev, Oleg Bayazitov, Varvara Sheptunova, Ekaterina Kopets	148
<i>EEG Emotion Classification using Genetic Algorithm-based Feature Selection and Gamma Function-based Dynamic Feature Fusion</i> Jotiraditya Banerjee, Asfak Ali, Om Karmakar, Avigyan Roy, Daria Sidorina, Ram Sarkar	152
<i>SAAMU-Net: A Selective Attention Aggregation and Memory-Augmented U-Net Model for Microscopic Medical Image Segmentation</i> Tanmoy Roy, Gouranga Maity, Sanchita Das, Gleb Solyanik, Daria Sidorina, Ram Sarkar	156
<i>Processing Images of Handwritten Documents using Computer Vision Methods</i> Tatiana M. Tatarnikova, Aleksey A. Shihotov	160
<i>Generating Pandas Code for Big Table Question Answering Using Large Language Models</i> A. A. Vyatkin, V. D. Oliseenko	164

5. MODELS AND METHODS FOR ARTIFICIAL INTELLIGENCE SYSTEMS. COGNITIVE SYSTEMS

6. FUZZY METHODS AND SYSTEMS

<i>Cyber-Physical and Socio-Cyber-Physical Systems Designing Using Digital Threads</i> Varvara Ya. Ananeva, Alexander I. Vodyaho	167
<i>Explainable AI 2.0: Conceptual Shifts and New Requirements</i> Alexey Averkin, Egor Volkov	171
<i>Intelligent Patient Routing Models in Emergent Situations – an Integrative Approach to Optimizing Distribution</i> Gleb O. Bondarenko, Anastasia R. Popova, Alyona S. Syryh, Yegor V. Patoka, Evgenii I. Geichenko, Vladislav S. Pavluk	174
<i>Reinforcement Learning to Optimize the Distribution of Patients within the Hospital during Emergencies</i> Gleb O. Bondarenko, Anastasia R. Popova, Alyona S. Syryh, Yegor V. Patoka, Evgenii I. Geichenko, Vladislav S. Pavluk	178
<i>Automated Analysis of Short Answers Using Text Vectorization</i> Chulpan Minnegalieva, Syumbel Ziyatdinova	182
<i>Novel Optimization Methods for Fuzzy Networks</i> Dmitriy A. Mikhailov, Maxim V. Abramov	186
<i>RetroSynthNet: A Sequence-to-Sequence Model for Retrosynthesis</i> Innocent Joseph, Yana A. Bekeneva, Onah Samuel Adakole, Taofeeq Mahfuz Muhammad, Rimven Nansel Peter	189

<i>Method for Predicting of the Opponent's Actions in Soccer Simulation based on Selected Rules</i> Dmitri Petrunenko, Sergey Belyaev	194
<i>Two-way Feedback System in Human-machine Interface</i> Danting Ma	198
<i>Analysis of the Relevance of the User's Communities to their Professional Profile based on Natural Language Processing Methods</i> A. O. Ivashchenko, E. A. Godzun, M. V. Abramov	202
<i>Supervised Machine Learning for SSRF Vulnerability Detection</i> Gabriela Guadalupe Chavez Quiroz, Nikita V. Voinov, Pavel D. Drobintsev, Igor V. Zajtsev	206
<i>Hardware Divider based on Goldschmidt Algorithm for FPGA Implementation</i> Olga I. Bureneva, Alexander P. Pavlov	210
<i>Formation of Cognitive Metaphors for Comparing Conceptual Models in Engineering Ontologies</i> Vladimir Gorokhov, Irina Brusakova	214
<i>Investigation of Convolutional Autoencoder for Noise Reduction in ECG Signal</i> Roman Kosenko, Alexander Mikhailov, Vasilii Pchelko, Pavel Burundukov, Vladislav Kholkin, Timur Karimov	217
7. NEW APPROACHES IN MEASUREMENTS: INTELLECTUAL, SOFT AND FUZZY MEASUREMENTS	
8. INTELLIGENT MEASUREMENTS SYSTEMS AND SENSORS	
<i>Solution to the Problem of Reconstructing Trajectory Parameters of a Flying Object Based on Video Information</i> D. S. Romanenko, S. A. Belyaev	220
<i>Least Squares Method with Adaptive Weights for Nonlinear Function Approximation in Arbitrary Bases</i> P. G. Burundukov, A. I. Karimov, A. A. Mikhailov, T. A. Shpilevaya, V. A. Pchyolko	223
<i>Automatic Irrigation System Using Solar Power System</i> Maryam Salim Ali, Amjed Jumaah, Aseel A. Qasim	227
<i>Control and Diagnostics System with Accelerated Deviation Analysis</i> E. M. Antonyuk, P. E. Antonyuk, D. S. Gvozdev	233
<i>Improving Energy Demand Management through Applying a Smart Electricity Grid for Energy Sector of Iraq</i> Hayder J. Mohammed, N. V. Korovkin	237
<i>Risk Assessment of Developing Territories based on Functional Geotaxons</i> V. V. Alekseev, V. S. Bryzgalo, N. V. Orlova	243
<i>Self-supervised Learning based Channel Estimation Method for IRS-enabled Mine Passage System</i> Alexey Militsyn, Ershov Roman, Viktor S. Karpukhin, Artem Militsyn, Yin Changwen, Vyacheslav Potekhin	247
9. TECHNOLOGIES AND SYSTEMS BIG DATA, DATA SCIENCE, BUSINESS INTELLIGENCE	
<i>Implementation of Federated Learning Algorithms for Non Independent and Identically Distributed Data</i> Kinda Mreish, Ivan I. Kholod, Tarek Alnajjar, Salar Sali, Yasser Nizamli	252
<i>Strategic Forecasting Model of Machinery Enterprise</i> Oleg Dranko, Aleksander Rezhnikov, Vadim Kushnikov, Aleksey Bogomolov, Iraida Stepanovskaya	258
<i>From Levenshtein Distance to Neural Search: a Comprehensive Approach to Latent Semantic Search based on Functional Reference Books</i> G. V. Orlov, A. N. Kalinichenko	262
<i>The Impact of Using Artificial Intelligence Technology (Expert Systems) on Audit Quality</i> Duraid Faris Khayoon, Hameed Tu'ma Hawi, Luay Qays Abdullh	266
<i>Federated Learning Platform</i> M. A. Kolpaschikov, Ivan I. Kholod	274
10. IOT AND INDUSTRIAL 4.0. TECHNOLOGIES AND SYSTEMS	
<i>Comparative Analysis of Digital Knowledge Bases and LLM Assistants for Supporting Business Processes in Industry 4.0</i> Daniil I. Mavrin	278
<i>A Cloud-Based Image Processing Platform for Smart Cities in Iraq</i> Nida Muhsin Ali	281
<i>Implementation of a Weather Station and Forecasting Weather using IOT: A Review</i> Manar Adnan Nasrat	290
<i>Intelligent Management of Business Processes in the Energy, Oil and Gas Industries of Russia</i> Aleksandr Karnauhov, Yuriy Kozhubaev, Aleksei Ilin, Viacheslav Ivanov	296
<i>Detection and Classification of Malicious Software in the IoT Environment Using Feature Selection by Deep Learning Methods</i> Saad Talib Hasson, Murtdha Saadoon Balasim, Mohammed Shakir Mohmood	300
<i>Hybrid Time Synchronization in Distributed Systems</i>	

Tatiana M. Tatarnikova, E. M. Arkhiptsev	307
<i>Preprocessing Android-based Mobile Devices Sensors Data for Machine Learning</i>	
Daniil Zabaluev, Ivan I. Kholod	311
<i>Video Streaming Traffic Prediction Using Machine Learning Techniques and Content Delivery Networks</i>	
Hamza Majid Hamid, Rana Fareed Ghani	315

11. ARTIFICIAL INTELLIGENCE AND MEASUREMENTS IN INDUSTRY, ECOLOGY AND ECONOMICS

<i>Managing Strategic IT Infrastructure Development Based on Fuzzy Rules</i>	
Artem R. Denisov, Vahid Miridashtaki, Kristina E. Gavriline	324
<i>Neuroregulators in the Control System of an Electric Drive of a Wind Turbine</i>	
Alexey Antonenko	329
<i>Use of Artificial Intelligence Techniques in Accounting and its Impact on the Work of Accountants</i>	
Luay Qays Abdullh, D. Waheed Ramo	332
<i>The Role of Deep Learning Techniques in Financial Reporting Challenges and Opportunities</i>	
Haider Layedh Meteab, Sinan Zuhair Mohammed Jameel, Ramadan Mahmood Ramo	339
<i>Soft Assessment of Publication Activity</i>	
Viktor P. Semenov, Roman V. Sokolov, Igor L. Andreevskiy	344
<i>Comparison of Reinforcement Learning Algorithms and Multi-Agent Ensemble Algorithms in Acoustic Recognition Tasks</i>	
Natalia A. Verzun, Kirill N. Egorov, Mikhail O. Kolbanov, Adelina R. Salieva	347
<i>Assessment of Miniature Rose Plants' Health using Multispectral Imaging</i>	
Viktor S. Goryainov, Jacques B. Ngoua Ndong Avele	350
<i>Development of a Resource Forecasting Model for Project Management Tasks in the Design and Construction of Facilities</i>	
Tagir Murzagaleev, Nataly Zhukova	354
<i>Study of Artificial Intelligence Methods and Systems in Renewable Energy for Iraq: A Review</i>	
Hayder J. Mohammed, N. V. Korovkin	357
<i>Analysis of Strategies for Optimizing Refueling Plans along the Automobile Route in Conditions of Limited Number of Refueling</i>	
Maksim S. Esin, Anastasiya A. Korepanova, Artyom A. Sabrekov	363
<i>System for Assessing Atmospheric Air Pollution in Urban Environment</i>	
Roman A. Myshko, Natalia I. Kurakina, Rodion A. Burdin	367
<i>Hybrid Fuzzy Neural Networks (HFNNs): A Study on Combining Fuzzy Logic and Neural Networks</i>	
A. K. Petrova, S. E. Abramkin	371
<i>Identification and Control of Ventilation and Air Conditioning Systems using Neural Networks</i>	
Nguyen M. Duc	374
<i>Toward Real-Time Maritime Surveillance: Deep Learning and Feature Fusion for Ship Detection</i>	
Diyar Ameenulhakeem, Osman Nuri ocan	378
<i>The Impact of Artificial Intelligence on Income Distribution: A Case Study on the Service Sector in Iraq</i>	
Zainab Mohammed Rashid	385
<i>Design and Cost Estimation of a Moisture Diagnostic Module at an Apatite-Nepheline Field</i>	
I. V. Vereschagin, S. N. Pasternak, V. I. Kozlova	393
<i>Design and Efficiency Evaluation of the Lighting Control System</i>	
I. V. Vereschagin, D. V. Gloukhov, V. I. Kozlova	398
<i>Digitalization Issues in Solving the Problem of Registration of Individual Groundwater Intakes</i>	
S. A. Chirkina, N. S. Martynov, E. R. Smolyar	405
<i>On the Development of High-tech Technologies in the Development of Industrial Water Deposits</i>	
V. M. Tyulkina, D. A. Stoyan, E. R. Smolyar	409
<i>Research on Communication Strategy of Computing Advertising Scene Based on Artificial Intelligence</i>	
Alexey Militsyn, Vyacheslav Potekhin, Cheng Haodong, Artem Militsyn, Viktor S. Karpukhin, Mi Xiaoyu	412
<i>Research on Efficient MIMO Signal Detection in Mines Based on Deep Learning</i>	
Vyacheslav Potekhin, Viktor S. Karpukhin, Hassan Shbib, Ershov Roman, Azez Mohamma, Ali Abbas	418

12. ARTIFICIAL INTELLIGENCE SYSTEMS FOR INTEGRATIVE PHYSIOLOGY

<i>AI-Driven Stitching of Retinal Smartphone-Based Images for Automated Fundoscopy</i>	
Ali Sultan Mayya	425
<i>The Role of an Artificial Intelligence in the Detection and Protection of Sensitive Information: A Review</i>	
Manar Adnan Nasrat, Bdoor Alaa Mahmood	428
<i>Impact of Augmentation Techniques on Transfer Learning Performance for Brain MRI Classification: a Comparative Study of Spatial and Feature Space Transformations</i>	
Yasser Nizamli, Weam Fadel, Anton Filatov, Yulia A. Shichkina, Kinda Mreish, Tarek Alnajjar	434

<i>Visual-language Model Fine-tuning via LoRA for Structured Medical Reports Generating for Lung X-ray Skans</i>	
Egor Volkov, Vadim Sechin, Alexey Averkin	438
<i>Application of Secure Visual Language Model-Based Framework for Collaborative Analysis of Dermatological Images</i>	
Jiafeng Yang, Alexey Subbotin, Natalia Zhukova	443
<i>Automation of Electrocardiographic Signal Analysis: Construction of Phase Portraits Based on Real-World Data</i>	
Alisa S. Ioronen, Yulia O. Bobrova	448
<i>Concept of a Pipeline System for Automatic Markup and Prediction of Epileptic Seizures based on Multimodal Analysis of EEG and Video Data</i>	
Ilia I. Malinin, Sergey A. Molodyakov	452
<i>A Novel Approach for Personalized DLPFC Localization in Neuroimaging and Brain Stimulation using Mask R-CNN</i>	
Apana Kenneth Ayinbuno	456