

# **2023 Seminar on Information Computing and Processing (ICP 2023)**

**Saint Petersburg, Russia  
27-28 November 2023**



**IEEE Catalog Number: CFP23UN8-POD  
ISBN: 979-8-3503-6984-7**

**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:	CFP23UN8-POD
ISBN (Print-On-Demand):	979-8-3503-6984-7
ISBN (Online):	979-8-3503-6983-0

**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

## Contents

Preface.....	2
Decision Support System for Scientific and Technical Expertise .....	3
<i>Belov Aleksandr V., Bikbaev Bulat I., Gevondyan Margarita S., Levitan Darya A., Panina Irina Yu.</i>	
Comparative Analysis of Renewable Energy Production Forecasting Algorithms Using Python .....	8
<i>Buchatskiy Pavel Yu., Teploukhov Semen V., Lisov Dmitry N., Rudenko Marina A., Kazak Anatoliy N., Dorofeeva Anna A.</i>	
The Mandatory State Digital Register of Personal Data Processing Consents .....	11
<i>Burenok Dmitry S.</i>	
Vulnerability Analysis of Electronic Voting Protocols .....	18
<i>Vasyutkin Alexander O., Butakova Natalia G.</i>	
Discrete Dynamics of Extremely Multistable Piecewise Chaotic System .....	22
<i>Vybornov Nikita A., Rybin Vyacheslav G., Wafubwa Jeff L., Kamal Owais</i>	
Intelligent Analysis of Big Data in the Information Flow .....	26
<i>Chetyrbok Petr. V., Shostak Marina A.</i>	
Study of Pseudo-Random Number Generators with Feedback Shift Register .....	29
<i>Chugunkov Ilya V., Kliuchnikova Bogdana V., Soboleva Aniya A., Belyakovskaya Anna N., Semenova Olga A., Markova Daria A.</i>	
Development and Study of Stochastic Algorithms for Lightweight Devices Architecture .....	32
<i>Chugunkov Ilya V., Kliuchnikova Bogdana V., Boronin Rostislav V., Dmitrieva Natalya Yu., Polovneva Yuliya A., Komarov Timofey I.</i>	
Spectral Investigation of Pseudo-Random Sequences: Token Analysis .....	35
<i>Chugunkov Ilya V., Doroshin Sergej Yu., Prokofiev Anton O.</i>	
Application of Machine Learning and Parallel Computing to Search for Hypersurfaces Containing Data in Non-Linear Spaces .....	38
<i>Demidova Kristina, Voronova Anna, Zhilenkov Anton A.</i>	
Metrics and Indicators of Security of Critical Resources in State and Corporate Objects and Processes.....	42
<i>Desnitsky Vasily A., Kotenko Igor V., Paraschuk Igor B., Fedorchenko Elena V.</i>	
Software for Presenting a Scientist’s Personal Brand .....	48
<i>Desyatnikov Felix A.</i>	
Fast Launch of Web Applications Based on Microservice Architecture .....	51
<i>Eliseev Pavel V.</i>	
Application Interface Methods and Structures for Using Natural Language Requests .....	56
<i>Evchenko Igor V., Klychkov Matvey D.</i>	
Developing a Program for the Digital Learning Environment of Higher Education: Text Recognition Using the Tesseract Artificial Intelligence Technology .....	59
<i>Gallini Nadezhda I., Denisenko Alexander A., Kazakov Alexander A., Gulyaev Sarvar M., Kulik Leonid A., Grishin Igor Yu</i>	
Development of a Unified Map of the Region Using AI Technology .....	64
<i>Gallini Nadezhda I., Denisenko Alexander A., Grishin Igor Yu</i>	
Scientific Gamification of Students in the Study of Artificial Intelligence Technology .....	68
<i>Gallini Nadezhda I., Grishin Igor Yu., Latysheva Marianna A., Denisenko Alexander A., Popov Maksim N.</i>	
QR Code Authentication System as an Ultimate Tool for Personal Cybersecurity .....	72
<i>Gordeev Mikhail A., Guminskii Oleg A.</i>	
Problems of Trajectory Planning in Manipulators with Parallel Kinematics .....	76
<i>Gritsenko Kristina</i>	
Myanmar Sports Sub-News Categorization Using Chi-Square, Bag of Words, and Cosine Similarity	

Combining with Smooth TF-IDF .....	80
<i>Hein Naing Soe, La Min Htut, Hein Htun, Nay Lynn, Saw Kyaw Htin Myo, Ko Ko Min</i>	
The Problem of Ensuring the Information Security of Robots in the Implementation of the Laws of Robotics .....	86
<i>Ivanov Gleb O., Kamenskikh Anton N., Yuzhakov Alexander A.</i>	
Overview of the Accelerated Platform for Robotics and Artificial Intelligence NVIDIA Isaac .....	89
<i>Kainova Tatiana D.</i>	
Methodology for Training Data Science Skills Based on Competitions on the Kaggle Platform .....	94
<i>Kalazhokov Zaur Kh., Makoveichuk Yan T.</i>	
Self-assembly Phenomenon Implementation Problems in Recurrent-Dynamic Architecture .....	97
<i>Khilko Dmitry V., Stepchenkov Yury A., Orlov Georgy A., Shikunov Yury I.</i>	
Development of an Optical Dental Recognition Subsystem in an Antropomorphic Simulator .....	102
<i>Kokoulin Andrey N., Yuzhakov Aleksander A., Kokoulin Rostislav A., Arutyunov Sergey D., Baydarov Andrey A.</i>	
Creation of a Hardware-Software Complex for Controlling a Five-Link Robotic Manipulator .....	106
<i>Kovalev Kirill K.</i>	
Unsupervised Texture Image Segmentation Based on Local Features .....	110
<i>Krupinin Oleg S.</i>	
FPGA-implementation of the Decision Block for Numerical Prediction System Based on Artificial Neural Networks .....	116
<i>Krutikov Alexander K., Meltsov Vasily Yu., Strabykin Dmitry A.</i>	
Absolute Randomness as a Key Part of Information Security .....	120
<i>Kulagin Vladimir P., Titov Andrey P., Alexandrov Alexander E., Borisov Sergey P., Bunina Ludmila V., Bikovsky Sergey S.</i>	
One Way to Compensate for Missing Values in Datasets .....	125
<i>Kuripta Oksana V., Lavlinskaya Oxana Yu., Desyatnikov Felix A., Lemeshkin Aleksandr V., Kuripta Grigory R.</i>	
Methodology for Applying IIoT Architecture to Design IIOT Systems in the Agricultural Sector of the Russian Federation .....	129
<i>Makoveichuk Krystina A., Olifirov Alexander V., Petrenko Sergei A., Makoveichuk Yan T., Kazak Anatoliy N.</i>	
Problems of Physically Plausible Simulation of the Motion of Mechanical Systems .....	135
<i>Medvedeva Angelina A., Portnov Ivan M.</i>	
Using GPUs and CUDA for Computer Simulation of Rigid Bodies Motion .....	140
<i>Moiseev Ilya S., Serebryakov Mikhail Y., Zhilenkov Anton A.</i>	
Hyperspectral Technology in State of the Art Computer Vision Application .....	143
<i>Motyko Alexander A., Chirkunova Anastasia A., Baranov Pavel S., Obukhova Nataliia A.</i>	
Problems of Training Spiking Neural Networks .....	150
<i>Nikitin Dmitry, Semenov Igor</i>	
Data Preprocessing Influence on the Medical Images Segmentation Quality .....	154
<i>Valenkova Daria, Lyanova Asya I., Tarapata Svetlana, Sinitca Aleksandr</i>	
Solving Agent Initialization Problems in a Multi-Agent System .....	158
<i>Podelenyuk Pavel, Epifantsev Ignat</i>	
Advanced Fog Neural Network Design Method .....	162
<i>Podlesnykh Ivan A., Bakhtin Vadim V.</i>	
Justification of an Experimental Stand Based on a Software-Defined Radio System for Detecting Technical Channels of Information Leakage .....	166
<i>Porkhun Anatoly S., Dushkin Alexandr V., Gureev Alexandr V., Los Vladimir P.</i>	
Development of an Automated Scheduling System Using Neural Network Technologies and Sorting Algorithms .....	171
<i>Protasov Yakov A., Erofeev Dmitry A., Borovkov Grigoriy S., Novozhilov Igor M.</i>	

Data Exchange Acceleration Methods in a Decentralized File System .....	174
<i>Rovnyagin Mikhail M., Sinelnikov Dmitry M., Varykhanov Sergey S., Khudoyarova Anastasia M., Yakovenko Ivan A., Shirokikh Tatyana A.</i>	
Intelligent Docker Container Orchestration for Low Scheduling Latency and Fast Migration in Paas .....	181
<i>Rovnyagin Mikhail M., Sinelnikov Dmitry M., Varykhanov Sergey S., Magazov Timur R., Kiamov Amir A., Shirokikh Tatyana A.</i>	
Semantic Text Summarization for Myanmar Language using Word Embedding and Graph Based Approach .....	186
<i>Sai Aung Thet Oo, Hein Htun, La Min Htut, Nay Lynn, Saw Kyaw Htin Myo, Ko Ko Min</i>	
Advantages and Disadvantages of Spiking Neural Networks Compared to Classical Artificial Neural Networks .....	192
<i>Semenov Igor, Nikitin Dmitry</i>	
Real-Time Simulation of Quadcopter Motion for Virtual Test Site .....	195
<i>Serebryakov Mikhail Y., Moiseev Ilya S.</i>	
Strategies and Methods of Overcoming Threats to Information Security in Social Educational Networks .....	201
<i>Shimichev Alexey S., Rotanova Mira B., Veretennikova Vasilisa A.</i>	
Development of an Automated Information System for the IT Clinic .....	204
<i>Shipunov Ilya S., Nyrkov Anatoliy P., Knysh Tatiana P., Shipunova Diana A., Demenev Danil A., Zubanova Anastasia A.</i>	
Comparing Prospective King AV1 Codec with Current Best Alternative HEVC in Different Applications .....	209
<i>Sirotnin Denis</i>	
Side-channel Attacks Protection for the GOST 34.12-2018 "Grasshopper" Algorithm Using Isomorphism in Finite Fields .....	212
<i>Skitev Andrey A., Shvetsova Anastasia A.</i>	
Zero-Knowledge Proof and its Application in Distributed Registry Systems .....	216
<i>Skorobogatova Anastasia E., Butakova Natalia G.</i>	
Determining the Genre of Music from a Melody Using Machine Learning and Parallel Data Processing .....	219
<i>Solodennikov Danila A., Makoveichuk Krystina A.</i>	
The Problem of Preserving the Governing Equations' Structure in Computer Simulation of Fluid Flow .....	222
<i>Tsareva Polina E.</i>	
Data Collection with Esp32 Microcontroller for Training Neural Networks .....	227
<i>Oleinikov Nikolay N., Kazak Anatoliy N., Dorofeeva Anna A., Boyarchuk Nadezhda K., Gorobets Daniil V., Nekhaychuk Dmitry V.</i>	
Regarding the Stability Assessment of the Informatization Object under the Conditions of Computer Attacks at the Exponential Distribution Law of Time to an Enemy Impact .....	230
<i>Voevodin Vladislav A., Vinogradov Ivan V.</i>	
Analysis of the Problems of Using VR Technology in Shipbuilding Design .....	235
<i>Zakharov Rodion O.</i>	
Application Encryption with Trusted Platform Module to Implement Standards in Windows 11 Environment .....	239
<i>Zharkova Alina A.</i>	

Autors Index