

2022 IEEE 4th International Conference on Advanced Trends in Information Theory (ATIT 2022)

**Kyiv, Ukraine
15 – 17 December 2022**



**IEEE Catalog Number: CFP22ATI-POD
ISBN: 979-8-3503-3263-6**

**Copyright © 2022 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:	CFP22ATI-POD
ISBN (Print-On-Demand):	979-8-3503-3263-6
ISBN (Online):	979-8-3503-3262-9

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

CONTENTS

Source Coding and Data Compression

<i>Vadym Savanevych, Vladimir Vlasenko, Sergii Khlamov, Olexander Briukhovetskyi, Eugen Dikov</i>		
1.	Matched Filter for Extended Images of Astronomical Objects in CCD-Frames from Streams	10
<i>Juliy Boiko, Ilya Pyatin, Olexander Eromenko</i>		
2.	Signal Processing in the Synchronization System of Communication Channel with OFDM	14
<i>Volodymyr Fedorchuk, Vitalii Ivaniuk, Vadym Ponedilok</i>		
3.	The Method of Decoding Signals of Temperature Sensors of Communication Network Equipment Based on the Use of Nonlinear Volterra Integral Models	19
<i>Daniil Smirnov, Valentyn Chepynoha, Olexandr Zorin, Artem Honcharov, Elena Palahina, Volodymyr Palahin</i>		
4.	The Methods of Joint Signal Discrimination and Parameters Estimation in Non-Gaussian Noise	23
<i>Tetiana Pylypiuk, Olena Smalko, Oleksiy Koval</i>		
5.	Research of Prospective Encoding Methods for Multimedia Content Protection	28
<i>Andrii Krasnorutsky, Volodymyr Barannik, Vitalii Kolesnyk, Nataliia Kharchenko, Anatolii Berchanov, Olexander Malko</i>		
6.	Method of Structural-Statistical Coding of Video Segments in Spectral-Cluster Space	32
<i>Olexandr Slobodyanyuk, Roman Onyshchenko, Andrii Krasnorutsky, Vitalii Kolesnyk, Valerii Bezruk, Sergey Podlesny</i>		
7.	Approach to Coding With Improved Integrity of Video Information for Transmission in Wireless Infocommunication Networks	38
<i>Olexandr Yudin, Dmytro Havrylov, Roman Onyshchenko, Kyrylo Revva, Ivan Pantas, Oleksii Mukoviz</i>		
8.	Platform Adaptive Integer Arithmetic Coding Technology Combination	43
<i>Vladimir Barannik, Andrii Krasnorutsky, Roman Onyshchenko, Vitalii Kolesnyk</i>		
9.	Technology of Coding Video Images in Structure-Cluster Space to Increase Efficiency and Reliability	47
<i>Andrii Krasnorutsky, Roman Onyshchenko, Vladimir Barannik, Dmitry Barannik</i>		
10.	The Methods of Intellectual Processing of Video Frames in Coding Systems in Progress Aeromonitor to Increase Efficiency and Semantic Integrity	53
<i>Tatyana Belikova, Natalia Korolyova, Andrii Vlasov, Olexandra Voitsekhivska, Pavlo Hurzhii, Mykhailo Babenko</i>		
11.	Methodology for Assessing the Security of Encoded Video Information Resources of Video Conferencing in Public Administration	57
<i>Serhii Buchyk, Serhii Pantas, Yurii Babenko, Volodymyr Manakov, Andrii Yermachenkov, Roman Onyshchenko</i>		
12.	Technology of Coding Video Resource to Increase Their Integrity and Availability	61
<i>Vladimir Barannik, Yurii Babenko, Vitalii Kolesnyk, Valeriy Barannik, Dmytro Zhuikov</i>		
13.	Method Taking into Account Level of Structural and Statistical Saturation of Video Segments in the Coding Process	66
<i>Vladimir Barannik, Valeriy Barannik, Sergii Shulgin, Natalia Barannik</i>		
14.	Method of Coding Subbands of Non-Homogeneous Spectrum of Video Segments in Uneven Diagonal Space	72

ATIT 2022, 15-16 December, 2022, Kyiv, UKRAINE

	<i>Sergii Shulgin, Valeriy Barannik, Natalia Barannik</i>	
15.	Dynamic Coding Method of Video Segments Stream by Specifying Structural Changes <i>Albert Lekakh, Oleg Kulitsa, Oleksandr Iakovenko, Victor Shchyrba, Vita Melnychuk, Gennady Pris</i>	76
16.	Processing Technology of a Flow of the Differential Provided Frames in Objective Video Inspection Infocommunication Systems <i>Volodymyr Barannik, Sergii Shulgin, Dmitry Barannik, Yevhenii Sidchenko</i>	80
17.	Quadrature Compression Technology in Two-Level Polyadic Space for Infocommunication Systems <i>Dmitry Barannik, Vladimir Barannik</i>	84
18.	Steganographic Coding Technology for Hiding Information in Infocommunication Systems of Critical Infrastructure <i>Sergey Podlesny, Rostislav Motsyk, Oleksandr Matviichuk-Yudin, Nataliia Bakhmat, Leonid Kolodiichuk, Valerii Tkachuk</i>	88
19.	Mathematical Model of The Process Encoding And Transmitting Video in Face of Cyberattacks <i>Valeriy Barannik</i>	92
20.	Technology of Structural-Binomial Coding to Increase the Efficiency of The Functioning of Computer Systems <i>Volodymyr Barannik, Serhii Sidchenko, Dmitry Barannik, Oleksandr Ignatyev</i>	96
21.	The Concept of Creating a Complex Cryptocompression Image Protection System in Infocommunications <i>Tatyana Belikova, Serhii Sidchenko</i>	101
22.	The Method Drawing up the Text with the Set Suggestive Orientation to Create a Hidden Channel <i>George Prokhorov, Yuriy Dobrovolsky, Rostyslav Diachuk</i>	106
23.	Hash-Function Algorithms Balanced on Reliability and Data Processing Speed <i>Oleh Kulitsa, Vitaliy Tverdokhlib, Oleksandr Matviichuk-Yudin, Vita Romaniuk, Olena Matviichuk-Yudina, Denis Narolskyi</i>	111
24.	Video Stream Intensity Control Technology Based on the Selection of Compression Process Parameters and Block Encoding	115

Network Information Theory

	<i>Lyudmyla Kuzmych, Dmytro Ornatskyi, Volodymyr Kvasnikov, Anna Kuzmych, Andriy Dudnik, Stepan Kuzmych</i>	
1.	Development of the Intelligent Instrument System for Measurement Parameters of the Stress - Strain State of Complex Structures <i>Daryna Feshchenko, Vilatii Marianovskyi</i>	120
2.	Wireless Network Planning <i>Serhii Laptiev, Tetiana Laptieva, Igor Polovinkin, Maksym Kuzmenko, Oleg Trakaliuk, Serhii Yevseiev</i>	125
3.	An Improved Method of Detection and Localization of Signals in the Digital Range <i>Oleksandr Laptiev, Igor Polovinkin, Andrii Sobchuk, Ivanna Salanda, Volodymyr Pichkur, Andrii Barabash</i>	129
4.	The Method of Managing Man-generated Risks of Critical Infrastructure Systems Based on Ellipsoidal Evaluation	133

ATIT 2022, 15-16 December, 2022, Kyiv, UKRAINE

	<i>Iryna Zamrii, Halyna Haidur, Andrii Sobchuk, Tatiana Hryshanovych, Kateryna Zinchenko, Igor Polovinkin</i>	
5.	The Method of Increasing the Efficiency of Signal Processing Due to the Use of Harmonic Operators	138
	<i>Vitalii Savchenko, Svitlana Lehominova, Taras Dzyuba, Oleksandr Matsko, Ivan Havryliuk, Iryna Novikova</i>	
6.	Model of Connectivity in a Mobile MESH Network for a Group of Unmanned Aerial Vehicles	142
	<i>Anton Mishchuk, Denys Shapovalov, Tetiana Voloshyna, Mykhaylo Voloshyn, Denys Karakhanov</i>	
7.	Orthogonal Chebyshev Polynomials in Signal Processing	148
	<i>Tetiana Voloshyna, Anton Mishchuk, Mykhaylo Voloshyn</i>	
8.	On the Problem of the Effectiveness of the Use of Trigonometric Polynomials in Signal Theory	152
	<i>Andrii Makarchuk, Inna Kal'chuk, Yurii Kharkevych, Galyna Kharkevych</i>	
9.	Application of Trigonometric Interpolation Polynomials to Signal Processing	156
	<i>Valentyn Sobchuk, Yurii Kharkevych, Inna Kal'chuk, Andrii Makarchuk, Galyna Kharkevych, Uliana Hrabova</i>	
10.	The Influence of the Fourier Transform Convergence on the Continuous Signals Processing	160
	<i>Roman Tovkach, Yurii Kharkevych, Inna Kal'chuk, Galyna Kharkevych</i>	
11.	The Saturation Property of the Signal Restoration Method	164
	<i>Taras Yusypiv, Oleksiy Kapustyan, Valentyn Sobchuk, Oleksandr Laptiev, Irina Shestak, Kateryna Zinchenko</i>	
12.	Robust Stability of Limit Regimes in Distributed Signal Transmission RD Systems	168
	<i>Oleksandra Aleksandrova, Yevhen Bashkov, Ararat Pohosian</i>	
13.	Approach for Creating a 3D Model of a Face from its 2D Image	173
	<i>Mykyta Aleksandrov, Yevhen Bashkov</i>	
14.	Method Using Partial Data to Confirm Completion of the Tree Parity Machines Synchronization	177
	<i>Pavlo Anufriiev, Yevhen Bashkov, Dmytro Khoma</i>	
15.	Experimental Face Recognition System Based on Improved Artificial Intelligence Model	181
	<i>Iryna Zamrii, Viktoriya Shkapa, Hanna Vlasyk</i>	
16.	The Method of Restoration and Identification of Information Flows in the Information Space	187
	<i>Volodymyr Afanasiev, Yrii Afanasiev, Vadym Fustii, Dmitryy Stepanenko, Pavlo Breus, Sergey Andrieiev</i>	
17.	Model of An Autonomous Monitoring System Based on Long Range Technology	193
	<i>Olga Leshchenko, Yurii Kravchenko, Nataliia Dakhno, Yurii Yermakov, Oleksandr Pliushch, Olexandr Trush</i>	
18.	Development of Model of Artificial Ecosystem on the Basis of Genetic Algorithm	199
	<i>Olena Starkova, Kostiantyn Herasymenko, Anna Bulgakova, Kyryl Nikolchev</i>	
19.	Virtualization and Programmability in Modern Networks in the Context of SDN Concept	204
	<i>Mykhailo Rakushev, Vitalii Zuiko, Roman Pantiushenko, Oleksii Nozdrachov, Volodymyr Khomenko, Oleksii Chornomaz</i>	
20.	The Technique of the Information and Telecommunication System "Terminal" Use for UAVs Acquired Data	208
	<i>Artem Kramov, Sergiy Pogorilyy</i>	
21.	Cross-Lingual Named Entity Recognition for the Ukrainian Language Based on Word Alignment	213

ATIT 2022, 15-16 December, 2022, Kyiv, UKRAINE

22.	<i>Kateryna Shmat, Oleksandr Trush, Mariy Trush, Olga Leshchenko, Andriy Dudnik</i> Mask Mode Monitoring System Using IT Technologies	219
23.	<i>Anatoliy Zhuchenko, Liudmyla Yaroshchuk, Lesya Ladieva, Bogdan Korniyenko, Andrii Istomin, Andrii Nesteruk</i> Information System for Optimal Control of the Vacuum Membrane Distillation Process	225
24.	<i>Dmytro Kovaliuk, Oleh Kovaliuk, Denys Skladannyi</i> Research the Fuzzy Controllers in Computer Control Systems	230
25.	<i>Olena Savchuk, Oleg Morgal</i> On the Neural Network Technologies Application in Diagnosing of the IT- Structure Element Base	234
26.	<i>Iryna Kononova, Ihor Subach, Borys Kredentser, Vadym Mohylevych, Dmytro Mogylevych, Viacheslav Riabtsev</i> Optimization of the Frequency of Maintenance of Long-Term Storage Facilities with Taking into Account Time Reservation	238
27.	<i>Olena Starkova, Kostiantyn Herasymenko, Kyryl Nikolchev, Anna Bulgakova</i> Implementation of Advanced Routing Methods Based on The SDN Concept and OS Linux	244
28.	<i>Nataliia Dakhno, Halyna Shevchenko, Olga Leshchenko, Yurii Kravchenko, Oleg Barabash, Andriy Dudnik</i> Using Mathematical Optimization Methods to Maximize Audience Reach with Budget Constraints	249
29.	<i>Nataliia Dakhno, Yurii Kravchenko, Leonid Lunin, Oleksandr Pliushch, Olexandr Trush</i> Analysis of VANET Connection Quality in Dynamic Environment	255
30.	<i>Oleksandr Pliushch, Yurii Kravchenko, Bohdan Zhurakovskiy, Alina Savchenko, Maxym Tyshchenko, Serhii Salkutsan</i> Studying Antenna-Feeder Matching Effects with Help of Computer Simulation Model	259

Information Theory and Technologies Security

<i>Dmitriy Klyushin</i>		
1.	Nonparametric Homogeneity Test for Small Samples and Its Applications to COVID-19 Epidemic Curve Forecasting <i>Sergii Kryvyi, Hryhorii Hoherchak</i>	264
2.	Analyzing Natural Language Knowledge Uncertainty <i>Oleksandr Ponomarenko, Olha Suprun, Andrii Ponomarenko, Nazarii Savorona, Vitalii Nechyporuk</i>	268
3.	Information Capacity of Traffic Parameters of the Wireless Network of Critical Application <i>Dmytro Kucherov, Valerii Tkachenko, Natalia Khalimon, Olexii Poshyvailo</i>	273
4.	Signals and Image Identification in Information Systems by Tensor Analysis Methods <i>Yaroslav Linder, Volodymyr Taranukha</i>	277
5.	Deep Learning Method for Extracting Information from Radar Images of Marine Objects <i>Kseniya Kurin, Oleksandr Yudin, Oleh Suprun, Oleksandr Provotar, Victor Kotetunov, Dmitry Barannik</i>	281
6.	Video Data Compression Coder Based on the Method of Structural Digital Image Representation	285

ATIT 2022, 15-16 December, 2022, Kyiv, UKRAINE

	<i>Kseniya Kurin, Oleksandr Yudin, Olha Suprun, Oleh Suprun, Oleksandr Provotar, Oleksii Yudin</i>	
7.	Visual Data Coding Algorithms for the Problem of Steganographic Information Protection <i>Kseniya Kurin, Oleksandr Yudin, Olha Suprun, Oleh Suprun, Olexandr Bakalynskyi, Oleksandr Ponomarenko</i>	290
8.	Effectiveness Evaluation of the Method for Invariant-Spatial Coding of Visual Data of Different Classes <i>Oleksandr Galkin, Oksana Shkilniak</i>	295
9.	Using Domain-Specific Language for Describing Actor-Oriented Systems <i>Mykhailo Strelbitskyi, Olha Suprun, Vitalii Bezsh tanko, Viktoriia Ivannikova, Evgen Ivanov, Olena Matviichuk-Yudina</i>	300
10.	Method for Determining the Informativeness and Compliance of Critical Data in the General Field of the Information and Communication System <i>Kseniya Kurin, Oleksandr Yudin, Olha Suprun, Viktoriia Ivannikova, Iryna Tregubenko, Oleksii Yudin</i>	304
11.	Method for Encoding the Message Source According to the Characteristics of the Structural Group and Their Quantitative Measure <i>Yevhen Artamonov, Iurii Golovach, Daniil Krant, Halyna Rosinska, Olena Nechyporuk, Svitlana Stanko</i>	308
12.	Dynamic Content Generation Methods Based on User Behavioral Ranking <i>Eugen Ivohin, Dmytro Biriukov, Mykhailo Makhno</i>	313
13.	Making Real Time Bidding Solution for Video ADS	319
	Index of Authors	323