

# **2023 International Conference on Information and Digital Technologies (IDT 2023)**

**Zilina, Slovakia  
20 – 22 June 2023**



**IEEE Catalog Number: CFP23CDT-POD  
ISBN: 979-8-3503-0587-6**

**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:	CFP23CDT-POD
ISBN (Print-On-Demand):	979-8-3503-0587-6
ISBN (Online):	979-8-3503-0586-9
ISSN:	2575-6753

**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

<i>Stanislaw Czapp, Filip Ratkowski, Seweryn Szultka, Krzysztof Szuchnik and Michał Kottun</i> Study of Soil Temperature and Moisture Changes in a Physical Model of an Underground Cable Line . . . . .	1
<i>Yehor Zheliazkov, Larysa Globa and Iuliia Yamnenko</i> System of Comfortable Live Level Improvement . . . . .	7
<i>Oleksandr Zhukov and Vitalii Horbenko</i> A Comparative Study of Deep Convolutional Neural Network Architectures to Identify Full Bee Body in Images . . . . .	21
<i>Martin Lukac and Michitaka Kameyama</i> Verification Based Algorithm Selection . . . . .	25
<i>Viktoria Sorokina and Sergey Ablameyko</i> 2D Cast Shadow Generation in E-commerce Using Transformer . . . . .	31
<i>Andrea Galadiková and Norbert Adamko</i> Usage of Proximal Policy Optimization Algorithm for Personnel Assignment in Railway Nodes . . . . .	37
<i>Sergey Stankevich, Anna Kozlova, Elena Zaitseva and Vitaly Levashenko</i> Multivariate Risk Assessment of Land Degradation by Remotely Sensed Data . . . . .	45
<i>Martin Kratky and Jitka Komarkova</i> Evaluating the Use of Very High-Resolution RGB Imagery from UAV for Vegetation Classification . . . . .	51
<i>Mária Bajúzová, Roman Hrmo, Nika Kvaššayová and Miroslav Kvaššay</i> The Rate of Use of Digital Tools in Relation to Teachers' Creativity . . . . .	57
<i>David Arie, Yuriy Bunyak, Olga Sofina, Roman Kvyetnyy and Oleg Bisikalo</i> The Model to Simulate Grades of Team-Play Learning on the Unispheer™ platform . . . . .	65
<i>Aleksandr Konikov, Mikhail Tatur and Ilya Nosurev and Peter Sedlacek</i> Satellite Navigation Receivers. Accuracy Measurements and Principles of Operation . . . . .	73
<i>Oleh Ilkiv, Olha Krasovska, Yuliia Pereguda, Lidiya Zavatska and Andrii Yasinskyi</i> The Efficiency of Distance Learning in Ukrainian Higher Education Institutions During the Martial Law Period . . . . .	79
<i>Ainura Gumarova, Gaukhar Kamalova, Aigul Kubegenova and Jan Rabcan</i> Building a Model and Assessing the Level of Morbidity During the Epidemic . . . . .	85
<i>Lenka Příbylová, Radim Briš, Vojtěch Novák and Lubomír Martínek</i> Methodological Overview of Prosperity Score - Matching Methods demonstrated on Colorectal Data . . . . .	89
<i>Zoltan Gal, Djamila Talbi and Mahmoud Tourky</i> On the Localization Properties of Swarm Intelligence Algorithms . . . . .	97
<i>Radim Briš and Pavel Jahoda</i> Maintenance Optimization of Dormant Systems Submitted to Failure Based PM and Imperfect CM . . . . .	105

<i>Agata Szultka, Seweryn Szultka, Stanislaw Czapp, Kamil Makowski and Peter Sedlacek</i> Estimation of the Maximum Permissible PV Power to be Connected to the MV Grid . . . . .	115
<i>Mykhailo Popov, Sergey Stankevich, Anna Kozlova, Iryna Piestova, Anna Khyzhnyak, Elena Zaitseva, Vitaly Levashenko, Eugeny Sereginin, Sergii Maltsev, Yuliia Lypska, Alina Kukharuk, Vita Rashchuk and Anhelina Smitiukh</i> The Architecture of Land Degradation Early Warning based on Earth Observation . . . . .	125
<i>Igor Melnyk, Serhii Tuhai, Mykhailo Skrypka, Alina Pochynok and Dmytro Kovalchuk</i> Approximation of Boundary Trajectory of Short-Focus Electron Beam using Third Order Root-Polynomial Functions and Recurrent Matrixes Approach . . . . .	133
<i>Jozef Papan, Ivana Bridova, Slavomír Tatarka and Michal Hraska</i> Fault Tolerance Solutions in IoT and Smart City . . . . .	139
<i>Pavel Wanecki, Roman Jasek and Irena Drofova</i> The Contribution of the European NIS2 Directive to the Design of the Cyber Security Model . . . . .	149
<i>Andriy Luntovskyy, Igor Melnyk and Alina Pochynok</i> 5G and Beyond: Shannon's Channel Capacity . . . . .	155
<i>Linda Blahova, Jakub Horecny and Jozef Kostolny</i> Segmentation of MRI Images using Clustering Algorithms . . . . .	169
<i>Michal Kvet</i> Using Boolean Data Type in Oracle Database - Performance Study . . . . .	179
<i>Irena Drofova, Milan Adamek and Pavel Wanecki</i> Forensics Science and Using a Color Model Digital Twin Artwork to Identify a Counterfeit . . . . .	187
<i>Miroslav Tomšů</i> Information Ecology, Problems and Negative Impacts In the Context of Information Technologies . . . . .	191
<i>Pavel Lukashkevich, Alexei Belotserkovsky, Hayk Grigoryan, Rita Abrahamyan, Hrachya Astsatryan and Aliaksei Sasnovich</i> LST Quality Evaluation Service for Heterogeneous Earth Observation Data . . . . .	195
<i>Jakub Jech and Pavel Jirava</i> Project Management Perspective on UAV Data Collection: Water Management Case Study Baroch . . . . .	201
<i>Hanan Tariq, Stanislaw Czapp and Vitaly Levashenko</i> RCDs Tripping in the Range from DC to AC 50 kHz for Slowly Rising Residual Current . . . . .	207
<i>Jakub Jech and Jitka Komárková</i> Comparison of Creating 3D Models from UAV: Case Study Windmill Černilov . . . . .	213
<i>Jörg Kammermann, Igor Bolvashenkov, Gabriel Romero and Hans-Georg Herzog</i> Reliability Statistics of Traction Electric Drive Components: Overview and Analysis . . . . .	219
<i>Marek Klimo, Eugen Antal and Miroslav Kvassay</i> Education Tools for Teaching Classical Ciphers . . . . .	227
<i>Olha Shaposhnyk, Vitalii Babenko, Maksym Chernykh, Svetlana Yanushkevich and Ievgen Nastencko</i> Inferring Cognitive Load Level from Physiological and Personality Traits . . . . .	233
<i>Behnaz Jafari, Kenneth Lai and Svetlana Yanushkevich</i> Investigating Association and Causal Relationships between Physiological Signals and Affective State . . . . .	243
<i>Djamila Talbi, Zoltán Gál and Janos Sztrik</i> Low Latency and High-Speed Communication Service with LEO Satellite Constellation . . . . .	251

<i>Pavol Galcik, Michal Mrena, Lucia Piatrikova and Sergey Stankevich</i> Advanced Priority Queues in the OPTICS Clustering Algorithm . . . . .	257
<i>Martina Hrínová Durneková and Michal Kvet</i> Optimization of the SELECT Statement Containing Window Functions . . . . .	267
<i>Marko Čepin</i> Self-sufficient Electric Energy Supply at Home . . . . .	273
<i>Sergii Tukaiev, Svitlana Fedorchuk, Mykola Makarchuk, Borys Palamar and Jo?o Miguel Alves Ferreira</i> Facial Electrodermal Potentials at rest State as Objective Criteria of Emotional Burnout Severity . . . . .	279
<i>Terézia Sliacka, Michal Varga and Norbert Adamko</i> Modeling of Hybrid Reasoning of Dynamic Agent in ABASim Architecture . . . . .	285
<i>David Matis, Peter Tarabek</i> Reinforcement Learning for Weighted p-median Problem . . . . .	293
<i>Ihor Kliushnikov, Vyacheslav Kharchenko, Herman Fesenko, Elena Zaitseva and Vitaly Levashenko</i> Reliability Models of Multi-state UAV-based Monitoring Systems: Mission Efficiency Degradation Issues . . . . .	299