SCM'2021

XXIV IEEE INTERNATIONAL CONFERENCE ON SOFT COMPUTING AND MEASUREMENT

PROGRAMME

May, 26 - 28, 2021

Saint Petersburg

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Programme
of 2021 IEEE XXIV International Conference on Soft Computing and Measurements
(SCM- 2021)
May 26-28, 2021
Saint Petersburg Electrotechnical University "LETI"
Prof. Popov str. 5, Saint Petersburg, 197376, Russia

May 26, 2021

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Plenary session
May 26, 2021, 10:00-13:30, *Zoom 1*

10:00 – 10:05
Viktor N. Sheludko (D.Sc., Associate Professor, Head of the Department of Automatic Control Systems, Rector of the Saint Petersburg Electrotechnical University "LETI" (ETU))
Welcome speech
10:05 – 10:10
Mikhail S. Kupriyanov (Doctor of Technical Sciences, Professor, Head of the Department of Computer Engineering, Saint Petersburg Electrotechnical University "LETI" (ETU))
Welcome speech
10:10 – 10:35
Vadim V. Borisov (Dr. habil. of Engineering Sciences, Professor, President of the Russian Association of Artificial Intelligence, National Research University "Moscow Power Engineering Institute" (the branch in Smolensk))
Fuzzy cognitive models are the basis for intelligent analysis of cyber-physical systems and processes
10:35 – 11:00
Svetlana V. Prokopchina (Doctor of Technical Sciences, Professor, Financial University under the Government of the Russian Federation)
The convolutional approach for the integration of methods of Artificial Intelligence (AI) and Measurement Science (MS), based on Bayesian intelligent technologies. The concept of Bayesian Measurement Network. The concept of IIIoT – Intelligent Industrial IoT.
11:00 – 11:25
Eric Benoit (Ph.D in Physics, Associate professor, Chair T7 (IMEKO), (University Savoie Mont Blanc, Polytech Annecy-Chambéry)
Some measurement fundamentals to improve AI approaches
11:25 – 11:50
Giovanni Battista Rossi (University of Genova)
Modelling direct and indirect measurements – Foundational issues
11:50 – 12:15
Sergey Y. Yurish (IFSA President, Barcelona, Spain)
Artificial Intelligence-Enabled Smart Sensor Systems: Bottom-Up & Hardware-Software Codesign
12:15 – 12:40
Kseniia V. Sapozhnikova, Roald Ye. Taymanov (IMEKO TC7 Members, "D.I. Mendeleyev Institute for Metrology" (VNIIM) which is the State Research Centre of the Russian Federation)
Artificial intelligence in measuring systems. The need for standardization.
12:40 – 13:05
Valery B. Tarasov (Associate Professor of CIM Department at the Bauman Moscow State Technical University, President of Russian Association for Fuzzy Systems and Soft Computing, Member of Scientific Council of Russian Association for Artificial Intelligence)
From Industry 4.0 to Industry 5.0: A New Challenge for Artificial Intelligence

13:05 – 13:30
Franco Pavese (Chairperson of the Technical Committee TC21 "Mathematical Tools for Measurements" of the international Association IMEKO)
Some current key metrological problems: understanding the new SI (2018) and implications of a possible information approach.

Session 1
General Measurement Theory. Metrology, Measures and Scales. Uncertainty in Measurements.

May 26, 2021, 15:00-15:40, *Zoom 1*

S. V. Prokopchina. The Convolutional Approach for the Integration of Methods of Artificial Intelligence (AI) and Measurement Science (MS), Based on Bayesian Intelligent Technologies. The Concept of Bayesian Measurement Network. The Concept of IIIoT – Intelligent Industrial IoT

A. A. Tselishcheva, K. K. Semenov. Metrological Approach to Solve Nonlinear Equations and Systems of Nonlinear Equations

O. A. Mikus, E. I. Tsvetkov. Identification of the Probability Density Distribution of a Random Value

V. A. Garanin, K. K. Semenov. The Systematic Approach for Estimating the Potential Increase of Measurement Results Accuracy Achieved by the Use of Dependencies between Measurands

Mohammed S. Hasan, Mohammed D. Albakhait, Al Mahturi F. Sharaf, Ahmed I. Jaber. Copper Losses Studying Using a New Real Time V/f Scalar Control Approach

Session 2 Probabilistic Methods in Information Processing. The Bayesian Approach.

May 26, 2021, 15:40-17:30, *Zoom 1*

V. F. Stoliarova, A. L. Tulupyev. Regression Model for the Problem of Parameter Estimation in the Gamma Poisson Model of Behavior: an Application to the Online Social Media Posting Data

P. I. Paderno, E. A. Burkov, E. A. Tolkacheva, E. A. Lavrov, O. E. Siryk. Expert Classification: Probabilistic Estimates

P. I. Paderno, E. A. Burkov, E. A. Tolkacheva, E. A. Lavrov, O. E. Siryk. Expert Classification: Resource-Based Approach

A. N. Gubin, V. L. Litvinov, F. V. Filippov. Researching the Relationship between Information Efficiency and Complexity of Digital Information Processing Devices

V. L. Gorokhov, I. A. Brusakova. The Success of Bayesian Statistics in Observational Astrophysics

V. I. Lutin, E. N. Desyatirikova, V. E. Mager. Anti-Jamming Radiometric Automatic Tracking System

A. V. Toropova, T. V. Tulupyeva. Approbation of the Behavior Rate Model with Hidden Variables Based on Respondents' Data on Recent Instagram Posts

V. D. Oliseenko, T. V. Tulupyeva. Neural Network Approach in the Task of Multi-Label Classification of User Posts in Online Social Networks

A. O. Khlobystova, M. V. Abramov. Adaptation of the Multi-Pass Social Engineering Attack Model Taking into Account Informational Influence

M. S. Frolova, A. A. Korepanova, M.V. Abramov. Assessing the Degree of the Social Media User's Openness Using an Expert Model Based on the Bayesian Network

May 26, 2021, 17:30-18:00, *Zoom 1*

Keynote speech by Witold Pedrycz (Professor, University of Alberta, Edmonton, Canada)
Data and Domain Knowledge-Oriented Elicitation of Interpretable Information Granules.

Session 5 Models and Methods for Artificial Intelligence Systems. Cognitive Systems.

May 26, 2021, 14:00-16:00, *Zoom 2*

S. A. Seliverstov, A. M. Sazanov, O. Yu. Lukomskaya, K. V. Nikitin, N. V. Shatalova, E. N. Benderskaya. Analysis of Modern Approaches to Optimizing Traffic Control Systems

E. N. Karuna, P. V. Sokolov. Comparative Analysis of Text Information Clustering Methods

N. V. Voinov, D. A. Ivanov, T. V. Leontieva, S. A. Molodyakov. Implementation and Analysis of Algorithms for Pitch Estimation in Musical Fragments

Yu. V. Katenko. Methodology for the Formation of a Set of Features for Describing Objects of a Social Network

S. V. Vlasenko. Usage features of semantic query and rule languages of Semantic Web in the intelligent systems, based on conceptual graphs technologies

N. A. Zhukova, I. A. Kulikov, N. Yu. Utkin. The Method for Searching Patterns in Log Files of Telecommunication Devices for Monitoring Their State

E. E. Kotova, I. A. Pisarev. Researching Cognitive Tasks Solving Taking into Account Visual Uncertainty

I. V. Gerasimov, I. G. Ankoudinov. Evaluation of the Fuzzy Cognitive Model of Professional Competences

Session 12 Application of Methods and Means of Artificial Intelligence and Measurements in Medicine.

May 26, 2021, 16:00-17:30, *Zoom 2*

A. N. Subbotin. Applying Machine Learning in Fog Computing Environments for Panoramic Teeth Imaging

N. M. Sheliakina, G. A. Mashevsky. Using Deep Learning Techniques for Endoscopic Image Analysis

Y. O. Bobrova, O. N. Kapranova, K. V. Filipenko. Algorithm for Detecting Alarming Fetal Conditions

S. P. Dragan, I. V. Olenina, E. V. Larkin, A. V. Bogomolov. Intelligent Information-measuring System for the Study of Acoustic Reflex

V. M. Uspensky. Neural Network Analysis of Electrocardiosignals for the Diagnosis of Diseases

I. L. Kashirina, M. A. Firyulina, Yu. V. Bondarenko, E. N. Desyatirikova, O. E. Efimova, L. V. Chernenkaya. Identification of Risk Factors for Mortality after Myocardial Infarction Using Machine Learning Methods

May 27, 2021

Session 11 Artificial Intelligence and Measurements in Industry, Ecology and Economics.

May 27, 2021 г., 9:00-12:00, *Zoom 1*

N. V. Voinov, P. D. Drobintsev, M. K. Voroshilov, O. V. Prokofiev, S. A. Molodyakov, I. V. Zajtsev. Predicting RTS Index Futures Using Machine Learning

I. A. Brusakova. Measurement Virtualization Technologies for Intelligent Information and Measurement Systems

S. A. Seliverstov, A. M. Sazanov, Y. A. Seliverstov, E. N. Benderskaya, K. V. Nikitin. Development of the Intelligent Traffic Management System Architecture

G. V. Verkhova, S. V. Akimov. Multi-agent Approach to the Formation of a Unified Geoinformation Environment

E. N. Zhdanova, E. S. Suloeva, M. M. Filippov, A. A. Minina. Principles of Geodatabase Arrangement for Studying the Sequestration Potential of Carboniferous Territories

M. E. Goncharenko, N. V. Romantsova. Design of the Afterburning Chamber Mock-up Casing

A. O. Nedosekin, Z. I. Abdoulaeva, A. E. Zhuk, E. A. Konnikov. Resilience Management of an Industrial Enterprise in the Face of Uncertainty

A. O. Nedosekin, Z. I. Abdoulaeva, O. A. Vul, E. A. Konnikov. Fuzzy Modeling of Economic Systems: Main Problems

G. A. Kupriianov, R. I. Solnitsev. On Software and Information Support for the Design and Operation of the Recycling Infrastructure

R. A. Fayzrakhmanov, D. V. Yarullin, P. Y. Fominykh. A Web-Data Driven HR Decision Support System Based on the IT Specialist Vector Model
S. G. Ivanov, Zahra Dorostkar. Cryptography Professional Rival (CPR): A Game Designing Model to Learn Cryptography

Session 6 Fuzzy Methods and Systems.

May 27, 2021, 12:00-13:30, *Zoom 1*

P. V. Chetyrbok. Fuzzy Neural Networks for Classification of Problems

V. P. Semenov, R. V. Sokolov, I. L. Andreevskiy. Fuzzy Assessment of the Competitiveness of Cloud Software Products

I. A. Shmidt, R. R. Narbekov, P. V. Ivanov. Fuzzy Control Algorithms for a Simulating Thermogasodynamic Parameters System on a Test Bench

N. A. Kharitonov, A. L. Tulupyev. Algebraic Bayesian Networks: the Generation of the Knowledge Pattern Canonical Representation

L. P. Kozlova, O. A. Kozlova. Ability of Solving Augmented Reality Problems with Fuzzy Logic Algorithms

V. S. Simankov, P. Yu. Buchatskiy, A. V. Shopin, S. V. Teploukhov, V. V. Buchatskaya. An Approach to Identifying the Type of Uncertainty of Initial Information Based on the Theory of Fuzzy Logic

May 27, 2021, 13:30-14:20, *Zoom 1*

Keynote speech by Luca Mari, Ph.D., chair of IEC/TC 1, Universita Carlo Cattaneo – LIUC, Italy.
Measurement, computation, simulation, etc: is there still a difference in the "Big Data" age?

May 28, 2021

May 28, 2021, 10:00-11:00, *Zoom 1*

Keynote speech by Adviser SCM`21 **Prof. Hojjat Adeli**, The Ohio State University (OSU), Columbus, Ohio, USA.
Impact of Ubiquitous Machine Learning on the Society.

Session 3 Systems Simulation. Complex Objects Control Under Uncertainty.

May 28, 2021, 11:00-14:00, *Zoom 1*

M. P. Belov, Dinh Dang Truong, Tran Dang Khoa. Synthesis of PID Controller with Neural Network for Nonlinear Electric Drive Exoskeleton

A. V. Skryabin, G. S. Veresnikov. Methods for Mechanical Failures Assessment to Determine the Technical State of Aircraft Control Surface Electromechanical Actuator

G. V. Verkhova, S. V. Akimov, S. P. Prisyazhnyuk. Distributed Multi-Agent Modeling of Complex Systems

L. P. Kozlova, O. A. Kozlova. Neural Network Control of the Liquid Cooling System

S. E. Abramkin, S. E. Dushin. Research of Controlled Processes of Cooling and Condensation when Gas Treatment for Transportation

Nguyen Dinh Khanh, V. E. Kuznetsov. Adaptive Load Compensation Algorithm Based on Signal Compensation Structure

V. V. Alekseev, P. G. Korolev, N. V. Orlova. Algorithmic Measurement of the Railway Track Defects

S. E. Mironov, L. E. Andreev. Translator of Complex Hierarchical VLSI Objects Layout Description from a Real Form to a Virtual Layout Model

N. A. Cherepanov, A. B. Petrochenkov, D. A. Dadenkov. Analysis of Production Quality Indicators Depending on the Deviation of Technological Parameters

Le Hong Quang, V.V. Putov, V.N. Sheludko, T.L. Rusyaeva. Adaptive Robust Control of a Multi-degree-of-freedom Mechanical Plant with Resilient Properties and Parametric and Functional Uncertainty

O. I. Zolotov, A. N. Ilyushina, I. M. Novozhilov. Spatially Distributed System for Monitoring of Fields Technical Condition in Mineral Resources Sector

T. B. Chistyakova, R. V. Makaruk, A. Ch. Tedtoev. Decision Support System for Color Control of Polymer Products Based on Fuzzy Models

A. M. Sinitca, A. K. Petrova. Neuro-fuzzy Model of Gas Balance Control

Session 4 Neurocomputing Networks and Neurotechnologies.

May 28, 2021, 14:00-14:30, *Zoom 1*

T. M. Tatarnikova, V. V. Cehanovsky, F. Bimbetov. One of the Options for Implementing a Control System for Accessing Vehicles to a Protected Area

Session 13 Application of Methods and Systems of Artificial Intelligence and Measurements in Agricultural Complexes for Sustainable Development of Territories.

May 28, 2021, 14:30-14:40, *Zoom 1*

Wenlong Yi, Deheng Zhao, Jun Yang, Tingzhuo Chen. Computer Simulation of Shape Evolutions of Plant Cells Based on Physical and Chemical Interactions.

May 28, 2021, 14:40-15:00, *Zoom 1*

Keynote speech by Co-chairmen of International Program Committee SCM`21 **Prof. Mikhail S. Kupriyanov**, Saint-Petersburg Electrotechnical University «LETI» St. Petersburg, Russia.
Development of hardware solutions for artificial intelligence systems at ETU «LETI».

Session 9 Technologies and Systems BIG DATA, Data Science, Business Intelligence.

May 28, 2021, 15:00-16:00, *Zoom 1*
V. B. Gisin, E. S. Volkova. Secure Outsourcing of Fuzzy Linear Regression in Cloud Computing

D. P. Plakhotnikov, E. E. Kotova. Comprehensive Analysis of Cyber-Physical Systems Data

Wenlong Yi, Qiude Li, Hua Yin, Hao Tang, Yingding Zhao. Efficient User Inspection Algorithm Based on Dual Bloom Filters Oriented for Blockchain Data Management Systems

Session 10 IoT and Industrial 4.0. Technologies and Systems.

May 28, 2021, 16:00-17:00, *Zoom 1*

A. I. Vodyaho, N.A. Zhukova, S. A. Abbas, I.A. Kulikov. Context Aware Data Collection Systems for Cyber-Physical Systems

A. S. Makaryan, M. M. Putyato. Conceptual Approach to the Implementation of the Proactive Defense Subsystem of the Operational Cybersecurity Center

T. M. Tatarnikova, V. V. Gryzunov, A. U. Kumanyaeva. Rationale for Information Security Requirements of Fog Computing

Session 7 New Approaches in Measurements: Intellectual, Soft and Fuzzy Measurements.

May 28, 2021, 12:45-13:15, *Zoom 2*

C. V. Mortin, D. G. Privezentsev. Development of a Convolutional Layer of a Neural Network for Detecting Defects in Sheet Metal Products on Defectoscopic Images

A. S. Zemlyakova, V. V. Jaschenko, I. I. Dukeov. Soft Measurement of Process Improvement Potential

Ya. A. Seliverstov, A. A. Komissarov, E. D. Poslovskaia, A. A. Lesovodskaya, A. V. Podtikhov. Detection of Low-toxic Texts in Similar Sets Using a Modified XLM-RoBERTa Neural Network and Toxicity Confidence Parameters

Session 8 Intelligent Measurements Systems and Sensors.

May 28, 2021, 13:15-14:00, *Zoom 2*

E. M. Antonyuk, P. E. Antonyuk, I. E. Varshavskiy. Asynchronous-cyclic Automatic Control System with Feedback on Permissible Deviation

Nimai Chandra Das, Raihan Uddin, Md. Ziaul Haque Zim, A. D. Skakun. Algorithm for Path Planning of Mobile Robot

May 28, 2021, 14:00-15:30, *Zoom 2*

Workshop 1
The concept of uncertainty in artificial intelligence, measurement theory and information theory. Similarities and differences.

28 мая 2021 г., 15:30-17:00, *Zoom 2*

Workshop 2
Cyber-physical systems. Discussion aspects: definition, basic properties, examples of application in applied problems.

May 28, 2021, 17:00-17:30, *Zoom 1*

Closure of the conference