

15th International Conference Intelligent Systems 2022

December 14 – 16, 2022

AGENDA

DAY 1 – 14 December 2022 (Wednesday)

09:00 – 10:00 Registration

09:30 – 10:00
Poster Session

10:00
Opening Ceremony

10:15
Plenary Keynote 1

11:00
Plenary Keynote 2

11:45
Photo Session

12:00 – 13:15
LUNCH

12:00 – 12:45
Poster Session

13:15 – 15:30
Technical Session 1

12:45
Transfer to Robotics
Center
(Vavilova str., 42)

15:45 – 17:15
Technical Session 2.1

13:15 – 18:15
Technical Session 3
(Vavilova str., 42)

17:30 – 19:00
Technical Session 2.2

18:15
Transfer from Robotics
Center to Dinner

19:00
Gala Dinner
RAS

DAY 2 – 15 December 2022 (Thursday)

10:00
Day 2 Keynote 3
online

10:45
Technical Session 2.3 (online)

13:30 – 14:00
Break

14:00
Technical Session 2.4 (online)

17:30
Closing Ceremony

15th International Symposium Intelligent Systems 2022

December 14 – 16, 2022

TECHNICAL PROGRAM

DAY 1 - 14 December 2022 (Wednesday)

10:00

Opening Ceremony

Keynote 1

Prof. Vladimir Arlazarov

Federal Research Center Computer Science and Control of the Russian Academy of Sciences, Moscow, Russia

10:15

CEO Smart Engines

Current Threats to the Security of Neural Network Models and Ways to Prevent Them

Keynote 2

Prof. Yuri Mitrishkin

M.V. Lomonosov Moscow State University,
Faculty of Physics, Moscow, Russia

11:00

V.A. Trapeznikov Institute of Control Sciences of Russian Academy of Sciences,
Moscow, Russia

Hierarchical cascade control systems for time-dependent dynamical plants as applied to magnetic plasma control in D-shaped tokamaks

11:45

Photo Session

12:00-13:15

LUNCH

Technical Session 1

Numerical Methods for Intelligent Control Systems

Conveners:

Askhat Diveev (FRC CSC of RAS, Russia)

Sergey Konstantinov (FRC CSC of RAS, Russia)

13:15

Avdeenko T. V., Timofeeva A. Yu., Murtazina M. S.

Comparative analysis of feature extraction methods for intelligence estimation based on resting state EEG data

13:30

Serov V. A., Voronov E. M., Dolgacheva E. L., Kosyuk E. Y.

A Hybrid Trans-Dimensional Evolutionary Algorithm of Dynamical Systems Control Multi-Criteria Optimization

13:45

Karaseva S. A., Papunin A. V., Belyakov V. V., Makarov V. S., Malahov D. Yu.

Structural analysis of hydrodynamical interaction of full-submerged Archimedes screws of rotary-screw propulsion units of snow and swamp-going amphibious vehicles with water area by methods of computer simulation

- 14:00 Klimenko A. B.
The system architecture and methods for efficient resource-saving scheduling in the fog
- 14:15 KruzHKov V. I., Mitrishkin Y. V., Pavlova E. A.
Real-time hardware identification of complex dynamical plant by artificial neural network based on experimentally processed data by smart technologies
- 14:30 Glushchenko A. I., Zhukov P. I.
Implicit adaptation of mesh model of transient heat conduction problem to heated substance
- 14:45 Osintseva E. A., Chimitova E. V.
Optimal design of reliability experiment based on the Wiener degradation model under limitation for the degradation index
- 15:00 Andrikov D. A., Kurbanov S. V.
Automating the study of a linearized model of diabetes mellitus and tuning a PID controller for this model
- 15:15 Pavlova E. A., Mitrishkin Y. V., KruzHKov V. I.
LMI-Synthesis and analysis of plasma vertical position control systems in tokamak

END of Technical Session 1

15:30-15:45

COFFEE-BREAK

Technical Session 2.1 Theoretical Foundation of Intelligent Systems

Conveners:

Oleg Korsun (GosNIAS, Russia)

Elena Sofronova (FRC CSC of RAS, Russia)

- 15:45 Serov V.A., Popova D.L., Rogalev P.P., Tararina A.V.
Neuro-evolutionary synthesis of game models of control under uncertainty based on distributed computing technology
- 16:00 Bakaev M. A., Heil Sebastian., Khvorostov V. A., Gaedke Martin
Labeled data quality in machine learning: Common sense and the preposterous effect for user behavior models
- 16:15 El-Khatib S. A., Skobtsov Y. A., Rodzin S. I.
Exponential particle swarm optimization method for complexly structured images segmentation
- 16:30 Melnikov A., Levin I., Dordopulo A., Slasten L.
Analysis of advanced computer technologies for calculation of exact approximations of statistics probability distributions
- 16:45 Agafonov A. A., Ponomarev A. V.
An Experiment on Ontology Concept Localization in Deep Convolutional Neural Networks
- 17:00 Grishina L. S., Bolodurina I. P., Shukhman A. E., Legashev L. V., Zhigalov A. Yu.
Extracting and processing of Russian unstructured clinical texts for a medical

decision support system

END of Technical Session 2.1

17:15-17:30

COFFEE-BREAK

Technical Session 2.2

Theoretical Foundation of Intelligent Systems

Conveners:

Oleg Korsun (GosNIAS, Russia)

Elena Sofronova (FRC CSC of RAS, Russia)

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| 17:30 | <u>Korsun O. N., Poliyev A. V., Stulovskii A. V.</u>
Aircraft optimal control for longitudinal maneuvers using population-based algorithm |
| 17:45 | <u>Mandrikova B. S.</u>
Natural data analysis method based on wavelet filtering and NARX neural networks |
| 18:00 | <u>Kuzmin V. R., Vorozhtsova T. N., Massel L. V.</u>
Design and development of information and computational system for energy facilities' impact assessment on environment |
| 18:15 | <u>Klevanskiy N. N., Glazkov V. P., Saparov Ye. K., Mavzovin V. S.</u>
From matryoshka and Fukuruma to hierarchies of criteria and ranking methods in multi-criteria problems of analysis and decision-making |
| 18:30 | <u>Du Kehao</u>
An overview of object detection and tracking algorithms |
| 18:45 | <u>Fazilov S. K., Urinov E. M., Radjabov S. S., Rashidov K. S.</u>
Face detection under partial occlusion by statistical analysis of local features |

END of Technical Session 2.2

Technical Session 3

Intelligent Systems in Robotics

Conveners:

Igor Prokopyev (FRC CSC of RAS, Russia)

Anna Daryina (FRC CSC of RAS, Russia)

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|-------|---|
| 13:15 | <u>Bureneva O. I., Mironov S. E., Safyannikov N. M., Sukhinets Zh. A.</u>
Functional converter for intelligent sensor and its layout design |
| 13:30 | <u>Krivsha N., Krivsha V., Butenkov S.</u>
Fuzzy granular approach for the non-homogeneous object images semantic segmentation |
| 13:45 | <u>Bereznev V. A.</u>
Optimality conditions for the principle of trajectories dividing |
| 14:00 | <u>Litunencko E. G., Gruzlikov A. M., Kolesov N. V., Skorodumov Yu. M.</u>
Mathematical model of information exchange in the autonomous underwater |

vehicle network

14:15 Zhou Ruiyang, Neusypin K. A.
ADRC-based UAV control scheme for automatic carrier landing

14:30 Prokopiev I. V., Diveev A. I., Shmalko E. Yu.
Autonomous navigation of a mobile robot assisted by its identified neural network model

14:45-15:15 **COFFEE-BREAK**

15:15 Daryina A. N., Prokopiev I. V.
Active simultaneous localization and mapping method based on model prediction

15:30 Shmalko E. Yu., Rummyantsev Yu. A.
Synthesis of a feedback controller by the network operator method for a mobile robot Rosbot in Gazebo environment

15:45 Khalapyan S., Rybak L., Nozdracheva A., Semenenko T.
Convolutional neural network application to automate the process of aliquoting biosamples

16:00 Volf D., Mamchenko M., Jharko E.
Control of unmanned vehicles in smart cities using a multi-modal brain-computer interface

16:15 Khodos A., Panteleyev M.
Supervised learning in virtual soccer formation recognition

16:30 Bykov N., Fedulov V.
Computer simulation of anti-drone system

16:45-17:00 **COFFEE-BREAK**

17:00 Muslimov T.
Particle swarm optimization for target encirclement by a UAV formation

17:15 Kosyanchuk V., Selvesyuk N., Zybin E., Novikov V., Olenev V., Solovyov A., Semyonov M.
Application of a deterministic optical network model for the implementation of an expert system knowledge base for the information transmission failure management

17:30 Gorkavyi M. A., Ivanov Y. S., Sukhorukov S. I., Zhiganov S. V., Melnichenko M. A., Gorkavyi A. I., Grabar D. M.
Collaborative robotic complex efficiency improving: an approach to the intellectualization of the control system

17:45 Andriyanov N.
Deep learning for detecting dangerous objects in X-rays of luggage

18:00 Malyshev D., Rybak L., Gaponenko E., Voloshkin A.
Algorithm for determining the singularity-free and interference-free workspace of a robotic platform for fruit harvesting

END of Technical Session 3

POSTER SESSION

9:30 - 10:00

12:00 - 12:45

TS 1 ID 50	<u>Fomin L.</u> , Rezets Yu., Smirnova E. Anomaly detection on video by detecting and tracking feature
TS 1 ID 55	Massel L. V., <u>Massel A. G.</u> , Mamedov T. G. Integration of mathematical and cognitive modelling in the software
TS 1 ID 61	<u>Gabdrakhmanova Nailia</u> , Pilgun Maria Time series analysis in neural network and mathematical models to detect social tension in the urban environment
TS 1 ID 84	<u>Kozhanova E. R.</u> , Danilov S. I., Belyaev V. V. Methods of recognition based on wavelet transform for analysis of characteristics of spherical quantum dot
TS 2 ID 11	Shichkina Y. A., <u>Fatkieva R. R.</u> , Isaenko Monitoring the condition of a patient with Parkinson's disease
TS 2 ID 54	Massel L. V., <u>Massel A. G.</u> , Shchukin N. I., Tsybikov A. R. Designing a digital twin of a wind farm
TS 2 ID 71	Gaskova D. A., Galperova E. V. Decision support in the analysis of cyber situational awareness of energy facilities
TS 2 ID 79	Fazilov Sh. Kh., Mirzaeva O. N., <u>Radjabov S. S.</u> , Mirzaeva G. R. Construction of a recognition algorithm based on the assessment of the interdependence between local elements of the face image
TS 2 ID 83	Mirzaev N. M., Rasulmukhamedov M. M., <u>Mirzaev O. N.</u> , Baratov J. R. Construction of statistical recognition algorithms based on two-dimensional threshold functions
TS 2 ID 86	<u>Dorofeev N.</u> , Grecheneva A. Intelligent gait data processing algorithm based on mobile phone accelerometer
TS 2 ID 95	<u>Belyaev V. V.</u> , Chausov D. N., Solomatin A. S., Kumar S., Swamynathan K., Margaryan H. L., Hakobyan N. G., Kucherov R. N., Ermakova M. V., Tsareva E. N. Estimation of electron mobility in materials of organic electronics taking into account intramolecular and intermolecular interactions
TS 2 ID 96	Tureshbaev A. T., <u>Omarova U. Sh.</u> , Myrzayev R. S. On the stability of collinear libration points in the three-body problem with two radiating masses
TS 2 ID 101	Mirzaev N., Ibragimova S., Nurmukhamedov T., <u>Meliev E.</u> , Mirzaeva G. A family of recognition algorithms based on the construction of k-dimensional threshold rules
TS 2 ID 104	Fazilov Sh., Radjabov S., Ibragimova S., Akimishev G., <u>Meliev E.</u> Model of recognition algorithms based on the selection of two-dimensional representative pseudo-objects in the training set

- TS 2 ID 108 Sofronova E.A.
Evolutionary Algorithm for Optimal Control of Traffic Flow
- TS 3 ID 57 Zatsarinnyy A. A., Shabanov A. P.
Methodological approach to controlling the degree of intentions about novel knowledge for the digital economy
- TS 3 ID 66 Ivanov Y. S., Zhiganov S. V., Gorkavyy M. A., Sukhorukov S. I., Grabar D. M.
Using an ensemble of deep neural networks to detect human keypoints in the workspace of a collaborative robotic system
- TS 3 ID 88 Margaryan H., Pokhsraryan D., Hakobyan N., Gasparyan P., Hovhannisyan D., Chilingaryan H., Belyaev V., Kuznetsov M.
Platform for real time spectroscopy based on NI-sbRIO system for optimal control of materials properties

DAY 2 - 15 December 2022 (Thursday)

Keynote 3

10:00 Prof. Sergey Zheltov
RAS Member, State Research Institute of Aviation Systems (GosNIIAS), Russia
Prospects of Artificial Intelligence in Aviation

Technical Session 2.3 (online) Theoretical Foundation of Intelligent Systems

Conveners:

Askhat Diveev (FRC CSC of RAS, Russia)

Evgeny Atamas (MSU, Russia)

10:45 Eze T. U., Ya. A. Bekeneva
Improved social network user recommendation system – the machine learning approach

11:00 Diveev A. I., Shmalko E. A.
Additional requirement in the formulation of the optimal control problem for applied technical systems

11:15 Yurchenkov A. V., Kustov A. Yu.
Anisotropy-based estimation for sensor network with non-centered disturbance

11:30 Deyatkin D. D., Trenev I. S.
Data generation with variational autoencoders and generative adversarial networks

11:45 Trenev I. S., Deyatkin D. D.
Feedback linearization control of nonlinear system

12:00 Ushakov Yu., Ushakova M., Legashev L.
Research of a virtual infrastructure network with hybrid software-defined switching

12:15 Denisov S. A., Kondrashev V. A., Zatsarinnyy A.A.
Dynamic job queues management for interactive and batch computations on HPC system

12:30 Volovich K. I., Denisov S. A., Zatsarinnyy A. A.
Providing high-speed data access for parallel computing in the HPC cluster

12:45 Levina A., Bolozovskii R.
Application of neural networks to power analysis

13:00 Beknazaryan A.
Expressive power of binary and ternary neural networks

13:15 Rybakov I., Yurkov N., Grishko A., Kochegarov I., Goryachev N.
Multi-criteria assessment of the technical level of complex system based on the formation of the Fishburn value function of its unit estimated indicators

END of Technical Session 2.3 (online)

13:30-14:00

BREAK

Technical Session 2.4 (online)
Theoretical Foundation of Intelligent Systems

Conveners:

Dmitry Karamzin (FRC CSC of RAS, Russia)

Elizaveta Shmalko (FRC CSC of RAS, Russia)

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| 14:00 | Chervontsev M., <u>Subbotin A.</u> , Vodyaho A., Zhukova N.
Use of dynamic models in cognitive cyber-physical systems |
| 14:15 | <u>Nguyen Van Lam</u>
Axisymmetric bodies of minimum resistance in a rarefied gas |
| 14:30 | <u>Barulina M.</u> , Gergenreter Yu., Zakharova N., Maslyakov V., Fedorov V., Ulitin I.
Predictive diagnosis of breast cancer based on cytokine profile |
| 14:45 | <u>Ulitin I. V.</u> , Barulina M. A., Velikanova M. G., Korolev A. Y., Kaluta T. Y., Glushakov I. A., Rahimov N. M., Fedonnikov A. S.
Using the STEGO neural network for scintigraphic image analysis |
| 15:00 | Levina A., Plotnikov A., <u>Ashmarov E.</u>
New class of attack on hash function SHA-256 |
| 15:15 | <u>Morozov S. M.</u> , Kupriyanov M. S.
Neuro-fuzzy system for power supply control |
| 15:30 | Avdeenko T. V., <u>Serdyukov K. E.</u>
Modified evolutionary test data generation algorithm based on dynamic change of fitness function weights |
| 15:45 | Proletarsky A. V., Neusypin K. A., <u>Selezneva M. S.</u>
Modern intelligent control systems: theory and implementation |
| 16:00 | <u>Kashevnik A.</u> , Ammar Ali
Light-weight 2D map construction of vehicle environment using semi-supervised depth estimation approach |
| 16:15 | <u>Tolmanova V. V.</u> , Andrikov D. A.
A review of engineering techniques for EEG processing |
| 16:30 | <u>Ganshin A. S.</u> , Andrikov D. A.
Robust system of algorithms for the functioning of biocompatible artificial liver devices |
| 16:45 | Antonov A., Laryushkin P., <u>Fomin A.</u>
Kinematic analysis of a novel 5-DOF Delta-type parallel robot |
| 17:00 | <u>Serov V. A.</u>
A hierarchical model of vector Nash equilibrium search in a control problem under conflict and uncertainty |
| 17:15 | <u>Smolin V.</u> , Sokolov S.
AGI's hierarchical component approach to unsolvable by direct statistical methods complex problems |

END of Technical Session 2.4

17:30

Closing Ceremony