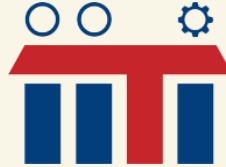




**Rostov State Transport University (Russia)**  
**St. Petersburg Federal Research Center of RAS (Russia)**  
**ITMO University (Russia)**  
**Russian Association for Artificial Intelligence (Russia)**



**7-th International Scientific Conference**



# **Intelligent Information Technologies for Industry**



## **Call for Papers**

 **September 25, 2023**

 **September 30, 2023**

 **St. Petersburg, Russia**

## Dear colleagues!

On behalf of the **IITI** organizers, we have a great pleasure to invite you to take part in the IITI'23 conference, which will be held on September 25-30, 2023 in St. Petersburg. It is the 7th Conference of the series "Intelligent Information Technologies for Industry". It is organized by Rostov State Transport University (Russia) with the support of the Russian Association for Artificial Intelligence. In 2023, the conference is co-organized by St. Petersburg Federal Research Center of RAS and ITMO University.

The purpose of **IITI** is to bring together the international advanced experience in the field of the development and implementation of the modern techniques in automation, digitalization and artificial intelligence in fundamental and applied sciences as well as the development of contacts in this sphere. The innovative intelligent information technologies are of particular interest at the conference.

Annually, **IITI** is held with the participation of leading international scientists. The history of the conference includes multiple international locations, such as Sirius (Russia), VSB-Technical University of Ostrava (Czech Republic), Technical University of Varna (Bulgaria), Istanbul Aydin University (Turkey) etc. Due to IITI, more than 1000 scientists from all over the world published more than 350 scientific papers in IITI Proceedings, which are indexed in Scopus and Web of Science.

The organizing committee of the conference is inviting interested researchers and professionals to submit papers describing significant scientific achievements and innovations in all areas of automation, digitalization and artificial intelligence. All submissions will be thoroughly peer-reviewed by multiple reviewers. Proceedings of IITI'23 conference will be published in [Springer series Lecture Notes in Networks and Systems](#). The publications will also be indexed in SCOPUS, INSPEC, WTI Frankfurt eG, zbMATH, SCImago. In addition, following the examples of the previous conferences, the probability of indexing in the Web of Science is high.

In 2023, the conference includes International Workshop "Application of Mathematical Methods in Artificial Intelligence".

## MAIN TRACK TOPICS

1. Bayesian Networks and Trust Networks, Fuzzy-Stochastic Modelling
2. Fuzzy Models and Systems
3. Non-Classical Logic and Plausible Inference
4. Neural Networks Technologies
5. Evolutional Modeling and Genetic Algorithms
6. Multiagent Systems
7. Decision Making Intelligent Systems
8. Machine Learning and its Applications
9. Automation and Intellectualization for Industrial, Transport and Energetic Systems

10. Intelligent medical systems
11. Flexible models of management over socio-technical systems
12. Explainability and bias in Artificial Intelligence
13. Cyber security in Industry 4.0

In the IITI'23 framework the International Workshop dedicated to application of mathematical methods in artificial intelligence is planned. The workshop will cover artificial intelligence in various areas from oil and gas industry and to information technologies.

## **IMPORTANT DATES**

### **March 6, 2023**

Deadline for application for participation in the conference. To make the submission just fill up the required fields at EasyChair (<https://easychair.org/conferences/?conf=iiti23> marked by “ \* ”, (to apply the participation, file of publication can be initially missed).

### **April 3, 2023**

Deadline for the paper submission (file of publication at [EasyChair page](#) must be uploaded before this date).

### **May 29, 2023**

Acceptance/rejection notification.

### **June 12, 2023**

Camera-ready and registration.

### **September 25-30, 2023**

Conference dates

## **CONFERENCE FEE**

Conference fee is 300 EUR as for the main track, as for the workshop. The payment is required only for accepted papers.

## ORGANIZATION

### Honored Chairs

- **Vladimir Vereskun**, Rostov State Transport University, Russia
- **Vladimir Vasiliev**, ITMO University, Russia
- **Andrey Ronzhin**, Saint-Petersburg Federal Research Center of Russian Academy of Sciences, Russia
- **Imran Akperov**, Southern University, Russia

### Conference Chairs

- **Igor Kotenko**, Saint-Petersburg Federal Research Center of Russian Academy of Sciences, ITMO University, Russia
- **Sergey Kovalev**, Rostov State Transport University, Russia

### Organizing Chairs

- **Alexander Guda**, Rostov State Transport University, Russia
- **Andrey Sukhanov**, Rostov State Transport University, JSC “NIIAS”, Russia
- **Danil Zakoldaev**, ITMO University, Russia

### Organizing Committee

- **Maria Butakova**, Southern Federal University, Russia
- **Anna Kolodenkova**, Samara State Technical University, Russia
- **Maria Koroleva**, Bauman Moscow State University, Russia
- **Dmitriy Levshun**, ITMO University, Russia
- **Ivan Olgeizer**, JSC “NIIAS”, Russia
- **Maria Shutova**, ITMO University
- **Vitezslav Styskala**, VSB-Technical University of Ostrava, Czech Republic

### International Program Committee

- **Maxim Abramov**, Saint-Petersburg Federal Research Center of Russian Academy of Sciences, Russia
- **Alexey Averkin**, Dorodnicyn Computing Centre of Russian Academy of Sciences, Russia
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- **Sebastian Basterrech**, VSB-Technical University of Ostrava, Czech Republic
- **Didier El Baz**, LAAS-CNRS, France
- **Ildar Batyrshin**, National Polytechnic Institute, Mexico
- **Alexey Bobtsov**, ITMO University, Russia
- **Vadim Borisov**, Moscow Power Engineering Institute in Smolensk, Russia
- **Alexander Boukhanovsky**, ITMO University, Russia
- **Alexander Bozhenyuk**, Southern Federal University, Russia
- **Bharat S Chaudhari**, MIT World Peace University, India

- **Andrey Chechulin**, ITMO University, Russia
- **Alexander Degtyarev**, Saint-Petersburg State University, Russia
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- **Elena Fedorchenko**, SPbSUT, Russia
- **Igor Fominykh**, Moscow Power Engineering Institute, Russia
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- **Xu Genjiu**, Northwestern Polytechnical University, China
- **Leonid Gladkov**, Southern Federal University, Russia
- **Vladimir Gorodetsky**, JSC "Eureca", Russia
- **Valeria Gribova**, Far Eastern Branch of the Russian Academy of the Sciences, Russia
- **Zhichang Guo**, Harbin Institute of Technology, China
- **Gao Hongwei**, Qingdao University, China
- **Mirjana Ivanovic**, University of Novi Sad, Serbia
- **Konstantin Izrailov**, The Bonch-Bruевич Saint-Petersburg state university of telecommunications, Russia
- **Alexey Karpov**, ITMO University, Russia
- **Valery Karpov**, The National Research Centre "Kurchatov Institute", Russia
- **Agop Khatlamadzhiyan**, JSC "NIIAS", Russia
- **Ivan Kholod**, Saint Petersburg Electrotechnical University "LETI", Russia
- **Boris Kobrinskii**, Federal Research Center "Informatics and Management" of the Russian Academy of Sciences, Russia
- **Alexander Kolesnikov**, Immanuel Kant Baltic Federal University, Russia
- **Konstantin Kornienko**, JSC NIIAS, Russia
- **Anatoly Korobeynikov**, IZMI RAS, Russia
- **Viktor Kureichik**, Southern Federal University, Russia
- **Vladimir Kureichik**, Southern Federal University, Russia
- **Oleg Kuznetsov**, Institute of Control Sciences of Russian Academy of Sciences, Russia
- **Sergey Kuznetsov**, Higher School of Economics, Russia
- **Yin Li**, Harbin Institute of Technology, China
- **Wei Lifei**, Shanghai Ocean University, China
- **Guangyu Liu**, Hangzhou Dianzi University, China
- **Qiang Lu**, Hangzhou Dianzi University, China
- **Sergey Makhortov**, Voronezh State Technical University, Russia
- **Muhammad Ary Murti**, Telkom University, Indonesia
- **Evgenia Novikova**, Saint Petersburg Electrotechnical University "LETI",

Russia

- **Aleksandr Panov**, Federal Research Center "Computer Science and Control" of the Russian Academy of Sciences, Moscow Institute of Physics and Technology, Artificial Intelligence Research Institute, Russia
- **Sergey Petrenko** , Innopolis University, Russia
- **Ovanes Petrosian**, Saint-Petersburg State University, Russia
- **Andrei Petrovski**, Robert Gordon University, United Kingdom
- **Wasim Raad**, Istanbul Aydin university, Turkey
- **Yuri Rogozov**, Southern Federal University, Russia
- **Gregory Royzenon**, Institute for Systems Analysis of Russian Academy of Sciences, Russia
- **Igor Saenko**, Saint-Petersburg Federal Research Center of Russian Academy of Sciences, Russia
- **Ilias Savvas**, University of Thessaly, Greece
- **Giuseppe ML Sarne**, University of Milano Bicocca, Italy
- **Rajeev Shorey**, IIT Delhi, India
- **Petr Skobelev**, Samara Federal Center of Russian Academy of Science & Samara State Technical University, Russia
- **Alexander Smirnov**, Saint-Petersburg Federal Research Center of Russian Academy of Sciences, Russia
- **Vadim Stefanuk**, Institute for Information Transmission Problems, Russia
- **Maya Sukhanova**, Azov-Black Sea State Engineering Institute, Russia
- **Dapeng Tan**, Zhejiang University of Technology, China
- **Alexander Tselykh**, Southern Federal University, Russia
- **Alexander Tulupyev**, Saint-Petersburg Federal Research Center of Russian Academy of Sciences, Russia
- **Lev Utkin**, Peter the Great St Petersburg Polytechnic University, Russia
- **Dmtry Vinogradov**, Federal Research Center "Informatics and Management" of the Russian Academy of Sciences, Russia
- **Jian Wang**, Hangzhou Dianzi University, Hangzhou, China
- **Wang Wenfa**, Yan'an University, China
- **Nadezhda Yarushkina**, Ulyanovsk State Technical University, Russia
- **Dmitry Yudin**, Moscow Institute of Physics and Technology, Artificial Intelligence Research Institute, Russia
- **Mikhail Zabezhailo**, Dorodnicyn Computing Centre of Russian Academy of Sciences, Russia
- **Dazhi Zhang**, Harbin Institute of Technology, China

## KEYNOTE SPEAKERS

### **Rajeev Shorey**

Ph.D., Professor, The University of Queensland - IIT Delhi Academy of Research (UQIDAR), IIT Delhi & Adjunct Faculty, IIT Delhi, India

#### **Recent Investigations in Machine Learning and Edge Computing**

In this talk, we highlight the research challenges in the intersection of Machine Learning and Edge Computing. More specifically, we look at the Federated Learning paradigm in a faulty edge ecosystem. Federated Learning deviates from the norm of "send data to model" to "send model to data". When used in an edge ecosystem, numerous heterogeneous edge devices collecting data through different means and connected through different network channels get involved in the training process. Failure of edge devices in such an ecosystem due to device fault or network issues are highly likely.

In this talk, we first analyse the impact of the number of edge devices on an FL model and provide a strategy to select an optimal number of devices that would contribute to the model. We observe the impact of data distribution on the number of optimal devices. We then investigate how the edge ecosystem behaves when the selected devices fail and provide a mitigation strategy to ensure a robust Federated Learning technique. Finally, we design a real-world application to highlight the impact of the designed mitigation strategy. The talk will end with a brief discussion of several open research problems in the intersection of Machine Learning and Edge Computing.

### **Vladimir Gorodetsky**

D.Sc. (Tech.), Professor, JSC Eureka, Russia

#### **Data Science and Artificial Intelligence in Context of Information Technology: Strangers, Competitors or Siamese Twins?**

The objective of the talk is to justify the various relationships between Data Science as a new one and AI existing and developing in a common interdisciplinary context. We intend to prove that although it is hardly possible to draw a clear boundary between these sciences both they have different research subjects, they have their own specific research methodologies, they solve many different problems, and each of these sciences contributes to strategic IT.

On the other hand, the presentation prove that it is the emergence of Data Science that has greatly contributed to a dramatic increase in the IT industry's interest to the practical use of AI models, methods and technologies. Exactly Data Science has made available, to AI professionals, new, very rich sources of knowledge that is big data. Indeed, this knowledge has become available due to Data Science, due to its methodology, models, methods, technologies and automotive software tools for extraction knowledge hidden in data and access to other kinds of values contained in it. It is well known that AI is unthinkable without knowledge, and Data Science methods, models, algorithms and technologies provide the bulk of the knowledge. Thus, both sciences, Data Science and AI are different sciences, but inseparable, from IT industry point of view, and therein lies the answer to the question posed in the title.

### **Alexey Karpov**

D.Sc. (Tech.), Professor, ITMO University, St. Petersburg Federal Research Center of RAS, Russia

#### **Intelligent interfaces and systems for human-computer interaction**

In this talk, I will briefly analyze a state-of-the-art in the area of intelligent interfaces and systems aimed for organization of natural human-computer interaction. I will provide major world-science trends in the direction of designing intelligent systems based on digital processing of

multimodal information (audio, video, and text) coming both from users to systems (intelligent analysis) and from systems to users (intelligent synthesis). In detail I will consider some samples of intelligent interfaces and systems for natural human-computer interaction that have been recently developed in the Speech and Multimodal Interfaces Laboratory of SPC RAS and aimed for complex multimodal analysis of human behavior including recognition of human's affective psycho-emotional states and personality traits with regard to actual tasks in industry.

### **Lev Utkin**

D.Sc. (Tech.), Professor, Peter the Great St. Petersburg Polytechnic University, Russia

### **Attention mechanism in machine learning models by tabular training data**

The attention mechanism is an effective method for improving the performance of neural networks. It has been successfully applied to many important tasks, including the natural language processing, computer vision, etc. In spite of the success, attention is a component of neural architectures and, therefore, the corresponding models meet difficulties of neural networks, including, overfitting, many tuning parameters, requirements of a large amount of data, the black-box nature, expensive computations. Moreover, tabular learning data may be also a problem encountered with neural networks. Therefore, new approaches to incorporate the attention mechanism into such models as random forests, the gradient boosting machine are proposed. The main idea behind the approaches is to apply the Nadaraya-Watson kernel regression model, which leads to outperforming results. Extensions of the attention mechanism, including self-attention and multi-head attention, are also considered. New models can be regarded as alternatives to the conventional attention mechanism when dealing with tabular training data.

### **Petr Skobelev**

D.Sc. (Tech.), Professor, Samara Federal Center of Russian Academy of Science & Samara State Technical University, Russia

### **Emergent Intelligence: from the concept - to applications**

The paper gives a new definition of the concept of "Emergent Intelligence (EI)", discusses the principles of designing and approaches to the development of EI systems, provide a brief description of the developed models, methods and algorithms for collective decision-making in EI, discusses the functions and architectures of the developed EI systems and presents the results of their application.

## **INTERNATIONAL WORKSHOP**

### **"Application of Mathematical Methods in Artificial Intelligence"**

The conference will host a workshop devoted to the Application of Mathematical Methods in Artificial Intelligence in industry ranging from the oil and gas industry to information technology. The explosion of data and computational power has been a key determinant in the development of Artificial Intelligence (AI), including machine learning and, especially, deep learning, in recent years. AI methods have become increasingly popular as a methodological tool to understand complex data and offer intelligent processing to help people to save time and effort. The topic of this Special Issue is very wide and covers the new fundamental methods in artificial intelligence and related fields, as well as the various applications of artificial intelligence to the different applied areas in industry ranging from the oil and gas industry to information technology. Topics of interest include but are not



limited to: Machine learning theory and applications; Deep learning and applications; Explainable AI; Data mining approaches; Knowledge-based systems; Expert system ; Multi-agent technologies.

The proceedings of the workshop will be included into the IITI'23 proceedings.

### **Workshop Chairs**

- **Ovannes Petrosyan**, St. Petersburg State University, Russia
- **Li Yin**, Harbin Polytechnic University, China

### **Workshop Program Committee**

- **Konstantin Amelin**, St. Petersburg State University, Russia
- **Zhang Dazhi**, Harbin Polytechnic University, China
- **Alexander Degtyarev**, St. Petersburg State University, Russia
- **Xu Genju**, Northwestern Polytechnic University, China
- **Anna Golovkina**, St. Petersburg State University, Russia
- **Oleg Granichin**, St. Petersburg State University, Russia
- **Gao Hongwei**, Qingdao University, China
- **Igor Ignatovich**, St. Petersburg State University, Russia
- **Wang Jian**, Hangzhou Dianzi University, China
- **Vladimir Korkhov**, St. Petersburg State University, Russia
- **Wei Laifei**, Shanghai Ocean University
- **Wang Wenfa**, Yan'an University, China
- **Deng Xiaote**, Peking University, China
- **Guo Zhichang**, Harbin Polytechnic University, China

## **CONFERENCE VENUE**

ITMO University.

## **WORKSHOP VENUE**

St. Petersburg State University.

## **PAPER SUBMISSION**

Papers reporting original and unpublished research results on the above and related topics are solicited. All submitted papers will be refereed for quality, originality and relevance by the Program Committee. The acceptance/rejection of the papers will be based on the review results. All questions should be addressed to contact e-mail. An electronic version (PDF format) of the full paper should be submitted by the paper submission deadline to the conference website. Manuscripts

should be provided according to the guidelines given at the following link were you can find the necessary styles and information:

<https://www.springer.com/series/15179>

(If this link does not work for you, go to <http://www.springer.com>, search for series "Lecture Notes in Networks and Systems" and follow the link "Instructions for Authors" to the right).

Authors guidelines, LaTeX and Word templates can be downloaded also from [here](#).

The papers will be published as an edited volume in Springer series entitled "Lecture Notes in Networks and Systems".

Only submissions in English language will be considered. The maximum number of pages is 10.

Please, use the following link to submit your paper:

<https://easychair.org/conferences/?conf=iiti23>

Further information is available on the conference website: [iiti.rgups.ru/en/](http://iiti.rgups.ru/en/)

## IITI CONTACTS

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