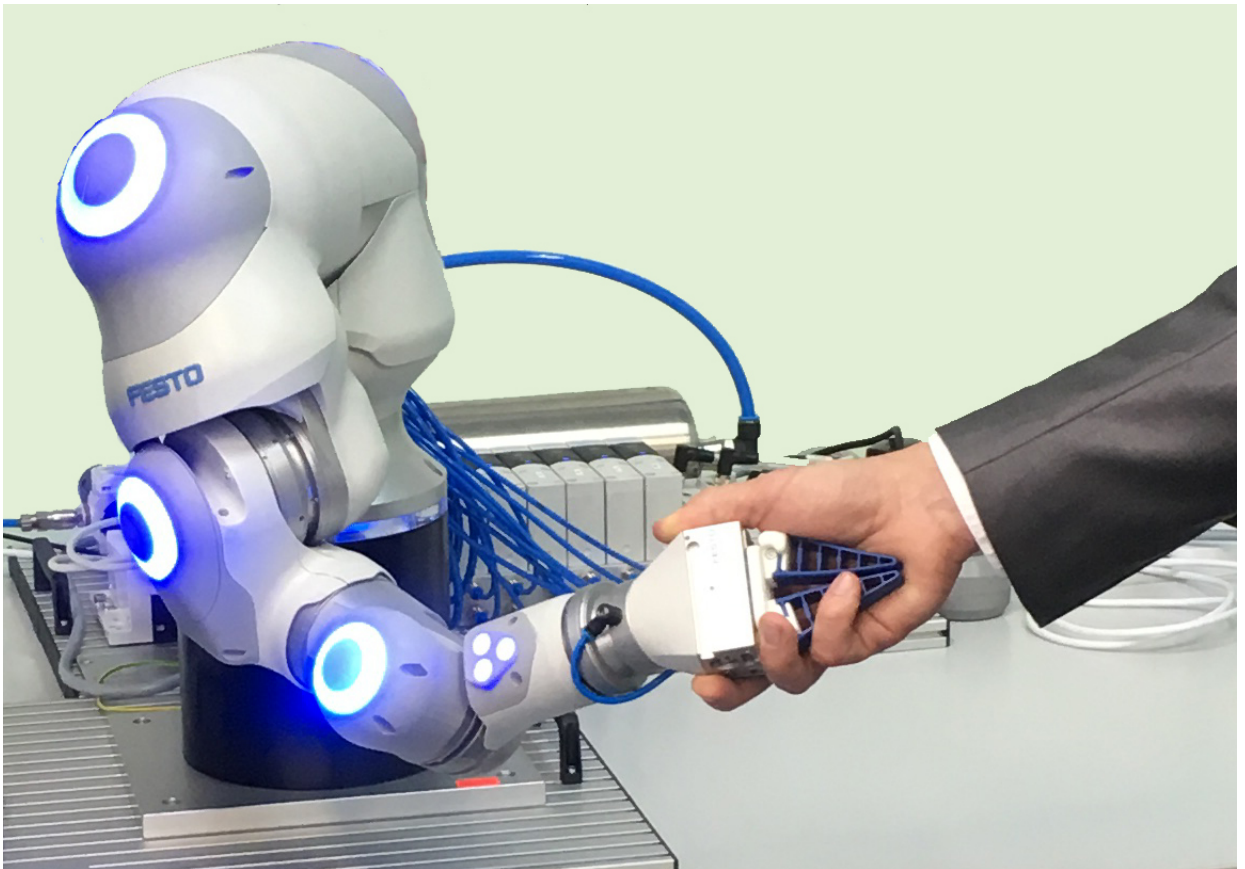




# CPS&C 2021 Programme



2nd International Conference  
Cyber-Physical Systems and Control  
St. Petersburg, Russia • 29 June — 2 July 2021



Dear colleagues,

We are pleased to welcome you to the **2nd International Conference on Cyber-Physical Systems and Control (CPS&C'2021)** which is held from 29 June to 2 July 2021 in St. Petersburg, Russia.

The **CPS&C'2021 Conference** is partially funded by the Ministry of Science and Higher Education of the Russian Federation as part of the World-Class Research Center program: Advanced Digital Technologies (contract No. 075-15-2020-934 dated 17.11.2020).

The first International Conference on Cyber-Physical Systems and Control (CPS&C'2019) was held in 2019 in St. Petersburg and attracted a large number of participants. The conference proceedings were published by Springer, and were indexed in Scopus.

The **CPS&C'2021 Conference** is expected to be an important forum for scientists and engineers to share the latest advances, developments and achievements in new theories, algorithms, models, and applications of prospective problems associated with cyber-physical systems with an emphasis on control theory and related areas. Our aim is to bring together researchers, practitioners and technologists from all over the world and to discuss and disseminate multidisciplinary fundamental scientific and engineering principles that underpin the integration of cyber and physical elements across all application areas.

The **CPS&C'2021 Conference** will include keynote and plenary talks, sessions and discussions. All accepted full papers will be published in a Scopus-indexed book of Conference Proceedings, based on the experience of the CPS&C'2019 Conference. In addition, a subset of papers will be selected for further substantial extension and modification. Such modified and extended papers could then be considered for publication in Scopus-indexed journals.

We would like to express our gratitude to all researchers, practitioners and students who are working in the field of cyber-physical systems for your support of the **CPS&C'2021 Conference**.

## Conference Co-Chairs

*Professor Ludger Overmeyer,  
Leibniz University Hannover,  
Germany*

*Professor Dmitry G. Arseniev,  
Peter the Great St. Petersburg  
Polytechnic University, Russia*

*Professor Nabil Aouf,  
City, University of London, UK*

## **Committees**

### **International Scientific Programme Committee**

- Professor Dmitry G. Arseniev, Co-Chair, Peter the Great St. Petersburg Polytechnic University, Russia
- Professor Nabil Aouf, Co-Chair, City, University of London, UK
- Professor Ludger Overmeyer, Co-Chair, Leibniz University Hannover, Germany
- Professor Alexey A. Bobtsov, St. Petersburg National Research University of Information Technologies, Mechanics and Optics, Russia
- Dr. Matthias Brockmann, RWTH Aachen University, Germany
- Professor Etienne Burdet, Imperial College London, UK
- Professor Frank Coolen, Durham University, UK
- Dr. Dimitri Galayko, Sorbonne University, France
- Professor Tatiana A. Gavrilova, Saint Petersburg University, Russia
- Professor George Halikias, City, University of London, UK
- Professor Shiyun Hu, University of Southampton, UK
- Professor (Samuel) Qing-Shan Jia, Tsinghua University, China
- Professor Heikki Kälviäinen, Lappeenranta University of Technology, Finland
- Professor Branko Katalinić, DAAAM International Vienna, Austria
- Professor Sanowar Khan, City, University of London, UK
- Professor Michael S. Kupriyanov, St. Petersburg Electrotechnical University “LETI”, Russia
- Professor Nikolay V. Kuznetsov, Saint Petersburg University; Peter the Great St. Petersburg Polytechnic University, Russia
- Professor Sanja Lazarova-Molnar, University of Southern Denmark, Denmark
- Professor Dmitry A. Novikov, V. A. Trapeznikov Institute of Control Sciences of the Russian Academy of Sciences, Corresponding member of RAS, Russia
- Professor Mourad Oussalah, University of Oulu, Finland
- Professor Nataliya D. Pankratova, Institute for Applied System Analysis, National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, Kyiv, Ukraine
- Dr. Dimitri Peaucelle, the Laboratory of Analysis and Architecture of Systems of the French National Centre for Scientific Research (LAAS-CNRS), University of Toulouse, France
- Professor Leonid I. Perlovsky, Harvard University; Northeastern University, MA, USA
- Professor Vladimir A. Polyansky, Institute of the Problems of Mechanical Engineering of the Russian Academy of Sciences, Russia
- Professor Anton N. Pronin, D.I. Mendeleev All-Russian Institute for Metrology, Russia

- Professor Andrey L. Ronzhin, St. Petersburg Federal Research Center of the Russian Academy of Sciences, Russia
- Professor Viacheslav P. Shkodyrev, Peter the Great St. Petersburg Polytechnic University, Russia
- Professor Oleg A. Stepanov, St. Petersburg National Research University of Information Technologies, Mechanics and Optics; Concern Central Scientific and Research Institute “Elektropribor”, Russia
- Professor Lev V. Utkin, Peter the Great St. Petersburg Polytechnic University, Russia
- Dr. James F. Whidborne, Cranfield University, UK
- Professor Nacer eddine Zarour, Abdelhamid Mehri University of Constantine 2, Algeria
- Professor Ying Zhang, Shanghai Maritime University, China
- Dr. Argyris Zolotas, Cranfield University, UK

### **Local Organising Committee**

- Professor Viacheslav P. Shkodyrev, Co-Chair, (SPbPU), Russia
- Professor Sanowar Khan, Co-Chair, City, University of London, UK
- Dr. Aleksandra V. Loginova, Conference secretary, (SPbPU), Russia
- Ms. Alexandra S. Kolgatina,, (SPbPU), Russia
- Dr. Vyacheslav V. Potekhin, (SPbPU), Russia
- Dr. Konstantin K. Semenov, (SPbPU), Russia
- PhD Candidate Lotfi Zarour, (SPbPU), Russia

**Tuesday, 29 June, 2021**

Academic Building, Grazhdansky Pr. 28A; online via MS Teams

Moscow Standard Time: GMT+3

<b>10:00-11:00</b>	<b>Registration</b>
11:00-11:30	<b>Open Ceremony</b> , Room 220, MS Teams Professor Dmitry G. Arseniev, Co-Chair, Peter the Great St. Petersburg Polytechnic University, Russia Professor Ludger Overmeyer, Co-Chair, Leibniz University Hannover, Germany Professor Nabil Aouf, Co-Chair, City, University of London, UK Professor Viacheslav P. Shkodyrev, Local Organising Committee Co-Chair, Peter the Great St. Petersburg Polytechnic University, Russia Professor Sanowar Khan, Local Organising Committee Co-Chair, City, University of London, UK
<b>11:30-11:45</b>	<b>Break</b>
<b>11:45-15:00</b>	<b>Plenary Session</b> , Room 220, MS Teams Chairpersons: Professor Dmitry G. Arseniev, Co-Chair, Peter the Great St. Petersburg Polytechnic University, Russia Professor Viacheslav P. Shkodyrev, Local Organising Committee Co-Chair, Peter the Great St. Petersburg Polytechnic University, Russia
11:45-12:45	<b>Keynote Lecture</b> , Room 220, MS Teams SAFE, HIGH-PERFORMANCE REAL-TIME COMPUTING FOR CYBER-PHYSICAL SYSTEMS Professor Marco Caccamo, Technical University of Munich (TUM), Germany
12:45-13:45	<b>Keynote Lecture</b> , Room 220, MS Teams PHYSICS OF MIND AND NEURAL NETWORKS Professor Leonid I. Perlovsky, Harvard University and Northeastern University, MA, USA
<b>13:45-14:00</b>	<b>Break</b>
14:00-15:00	<b>Keynote Lecture</b> , Room 220, MS Teams EVENT-BASED REINFORCEMENT LEARNING FOR CYBER-PHYSICAL ENERGY SYSTEMS – FROM SMART BUILDINGS TO SMART CITIES Professor (Samuel) Qing-Shan Jia, Tsinghua University, China
<b>15:00-15:45</b>	<b>Break</b>

15:45-18:00	Sessions			
	Fundamentals 1, MS Teams	Technologies 1, MS Teams	Applications 1, MS Teams	Education and Social Aspects 1, MS Teams
15:45-16:00	F1-1	T1-1	A1-1	E1-1
16:00-16:15	F1-2	T1-2	A1-2	E1-2
16:15-16:30	F1-3	T1-3	A1-3	E1-3
16:30-16:45	F1-4	T1-4	A1-4	E1-4
16:45-17:00	F1-5	T1-5	A1-5	E1-5
17:00 -17:15	F1-6	T1-6	A1-6	E1-6
17:15-17:30	F1-7	T1-7	A1-7	E1-7
17:30-17:45	F1-8	T1-8	A1-8	E1-8
17:45-18:00	F1-9	T1-9	A1-9	E1-9
18:00-18:10	<b>Break</b>			
18:10-18:40	<b>First Day Conference Summary, MS Teams</b>			

## Wednesday, 30 June, 2021

Academic Building, Grazhdansky Pr. 28A, online via MS Teams

Moscow Standard Time: GMT+3

10:00-14:10	<b>Plenary Session</b> , Room 220, MS Teams Chairperson: Professor Sanowar Khan, Local Organising Committee Co-Chair, City, University of London, UK		
10:00-11:00	<b>Keynote Lecture</b> , Room 220, MS Teams AI EVOLUTION: FROM ACADEMIC RESEARCH TO THE GLOBAL TECHNOLOGY TREND Professor Tatiana A. Gavrilova, Saint Petersburg University, Russia		
11:00-12:00	<b>Keynote Lecture</b> , Room 220, MS Teams FROM PERCEPTION TO NAVIGATION, GUIDANCE AND CONTROL FOR AUTONOMOUS SYSTEMS Professor Nabil Aouf, City, University of London, UK		
12:00-13:00	<b>Keynote Lecture</b> , Room 220, MS Teams APPLICATIONS OF COMPUTER VISION AT LUT UNIVERSITY Professor Heikki Kälviäinen, Lappeenranta-Lahti University of Technology LUT, Finland		
13:00-13:10	<b>Break</b>		
13:10-14:10	<b>Keynote Lecture</b> , Room 220, MS Teams CYBER-PHYSICAL SYSTEMS OPERATION WITH GUARANTEED SURVIVABILITY AND SAFETY UNDER CONDITIONS OF UNCERTAINTY AND MULTIFACTOR RISKS Nataliya D. Pankratova, Institute for Applied System Analysis, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine		
14:10-14:25	<b>Break</b>		
14:25-16:25	Special Session "Global Smart Manufacturing" (RWTH Aachen University) MS Teams	Fundamentals 2, MS Teams	Technologies 2, MS Teams
14:25-14:40	G-1	F2-1	T2-1
14:40-14:55	G-2	F2-2	T2-2
14:55-15:10	G-3	F2-3	T2-3
15:10-15:25	G-4	F2-4	T2-4
15:25-15:40	G-5	F2-5	T2-5
15:40-15:55	G-6	F2-6	T2-6
15:55-16:10	G-7	F2-7	T2-7
16:10-16:25	G-8	F2-8	T2-8
16:25-16:35	<b>Break</b>		

<b>16:35-18:50</b>	<b>Sessions</b>		
	Data-Driven and Proactive Control in CPS, <b>Zoom</b>	Applications 2, MS Teams	Education and Social Aspects 2, MS Teams
16:35-16:50	D-1	A2-1	E2-1
16:50-17:05	D-2	A2-2	E2-2
17:05-17:20	D-3	A2-3	E2-3
17:20-17:35	D-4	A2-4	E2-4
17:35-17:50	D-5	A2-5	E2-5
17:50-18:05	D-6	A2-6	E2-6
18:05-18:20	D-7	A2-7	E2-7
18:20-18:35	D-8	A2-8	E2-8
18:35-18:50	<b>Break</b>	A2-9	<b>Break</b>
<b>18:50-18:55</b>	<b>Break</b>		
<b>18:55-19:15</b>	<b>Second Day Conference Summary, MS Teams</b>		



**Thursday, 1 July, 2021**

Academic Building, Grazhdansky Pr. 28A, online via MS Teams

Moscow Standard Time: GMT+3

11.00-15:15	<b>Plenary Session</b> , Room 220, MS Teams Chairperson: Dipl.-Ing. Björn Niemann, Leibniz University Hannover, Germany		
11:00-12:00	<b>Keynote Lecture</b> STABILITY AND HIDDEN ATTRACTORS IN THE SIMULATION AND THEORETICAL STUDY OF DYNAMICAL MODELS Nikolay V. Kuznetsov, Saint Petersburg University; Peter the Great St. Petersburg Polytechnic University, Russia		
12:00-13:00	<b>Keynote Lecture</b> INTEGRATED OPTICS Ludger Overmeyer, Leibniz University Hannover, Germany		
13:00-13:15	<b>Break</b>		
13:15-14:15	<b>Keynote Lecture</b> DATA ANALYTICS FOR SMART ENERGY CYBER-PHYSICAL SYSTEM SECURITY Professor Shiyang Hu, University of Southampton, UK		
14.15-15:15	<b>Keynote Lecture</b> , Room 220, MS Teams CYBER-PHYSICAL SYSTEMS AS A TECHNOLOGICAL PLATFORM OF SYNERGY INTEGRATION TRENDS IN INFORMATION, CONTROL AND COMMUNICATION SCIENCES Professor Viacheslav P. Shkodyrev, Peter the Great St. Petersburg Polytechnic University, Russia		
15:15-15:50	<b>Break</b>		
15:50-18:05	<b>Sessions</b>		
	Neural Networks, MS Teams	Cybersecurity, MS Teams	Applications 3, MS Teams
15:50-16:05	N-1	C1-1	A3-1
16:05-16:20	N-2	C1-2	A3-2
16:20-16:35	N-3	C1-3	A3-3
16:35-16:50	N-4	C1-4	A3-4
16:50-17:05	N-5	C1-5	A3-5
17:05-17:20	N-6	C1-6	A3-6
17:20-17:35	N-7	C1-7	A3-7
17:35-17:50	N-8	C1-8	A3-8
17:50-18:05	N-9	<b>Break</b>	<b>Break</b>
18:05-18:20	<b>Break</b>		
18:20-19:00	<b>Closing Ceremony</b> , MS Teams		

**Tuesday, 29 June, 2021**

**Session “Fundamentals-1”**

15:45-18:00

Chairpersons:

Professor Galina F. Malykhina, Peter the Great St.Petersburg Polytechnic University, Russia

PhD Candidate Lotfi Zarour, Peter the Great St.Petersburg Polytechnic University, Russia,

lotfi.zarour.92@gmail.com

Paper ID	Paper Information
F1-1	PHYSICS INFORMED RADIAL BASIS FUNCTIONS NETWORKS: SOLVING INVERSE PROBLEMS FOR PARTIAL DIFFERENTIAL EQUATIONS Vladimir Gorbachenko, Dmitry Stenkin, Penza State University, Russia
F1-2	PROCESSOR ARCHITECTURE FOR INDUSTRIAL CYBER-PHYSICAL SYSTEMS Leonid Zakharov, Oleg Rebrin, The Ural Federal University named after the first President of Russia B. N. Yeltsin, Russia
F1-3	APPLICATION OF THE NONLINEAR CORRECTION METHOD FOR ALTITUDE CONTROL AND LANDING OSCILLATIONS PREVENTION Iuliia S. Zaitceva, Boris R. Andrievsky, IPME RAS, Russia; Dmitry.G. Arseniev, Peter the Great St. Petersburg Polytechnic University, Russia; Nikolay V. Kuznetsov, Saint-Petersburg State University, IPME RAS, Russia
F1-4	DECISION-MAKING SUPPORT SYSTEM BASED ON QUALITATIVE APPROACH Vladimir Amosov, Alexander Petrov, Anton Tyshkevich, Peter the Great St.Petersburg Polytechnic University, Russia
F1-5	UNIFORM DISTRIBUTION LAW AS A BASE OF STATISTICAL DECISION CRITERIA Sergei Efimenko, Anatolii Smetankin, Igor Chernorutsky, Peter the Great St.Petersburg Polytechnic University, Russia; Aleksandr Klavdiev, Saint Petersburg Mining University, Russia; Vladimir Shilkin, Sergey Kolesnichenko, Admiral Makarov State University of Maritime and Inland Shipping, Russia
F1-6	WAVELET-BASED TECHNOLOGY FOR DIAGNOSING CEREBRAL BLOOD FLOW AUTOREGULATION FOR INTEGRATED PLATFORM SOLUTIONS IN DIGITAL MEDICINE Nargis Mukhidinova, Galina Malykhina, Peter the Great St. Petersburg Polytechnic University, Russia; Vladimir Semenyutin, Almazov National Medical Research Centre, Russia
F1-7	ON A METHOD FOR IDENTIFYING FAILURE MODELS OF COMPLEX SYSTEMS Anatolii Smetankin, Sergei Efimenko, Igor Chernorutsky, Peter the Great St.Petersburg Polytechnic University, Russia; Eduard Zheleznov, Iuliia Cimai, Sergey Kolesnichenko, Admiral Makarov State University of Maritime and Inland Shipping, Russia
F1-8	BUILDING DECENTRALIZED RESILIENT CYBER-PHYSICAL SYSTEMS FOR OPERATING IN OPEN AREAS Dmitriy Levonevskiy, St. Petersburg Federal Research Center of the Russian Academy of Sciences, Russia
F1-9	METHOD OF EXPANSION OF MATHEMATICAL TOOLS OF THE RELIABILITY THEORY DUE TO THE PROPERTIES OF STOCHASTIC THEORY OF SIMILARITY Sergei Efimenko, Anatolii Smetankin, Igor Chernorutsky, Peter the Great St.Petersburg Polytechnic University, Russia; Aleksandr Liashenko, Saint-Petersburg State University of Aerospace Instrumentation, Russia; Melania Arutunyan, Sergey Kolesnichenko, Admiral Makarov State University of Maritime and Inland Shipping, Russia

## Session “Technologies-1”

15:45-18:00

Chairpersons:

Professor Ying Zhang, Shanghai Maritime University, China

Dr. Vladimir Khokhlovskiy, Peter the Great St. Petersburg Polytechnic University, Russia,

hohlovskij\_vn@spbstu.ru

Paper ID	Paper Information
T1-1	3D ENVIRONMENT RECONSTRUCTION ON INDUSTRIAL TRUCKS USING MULTIPLE RGB-D CAMERAS Lukas Jütte, Ludger Overmeyer, Leibniz University Hannover, Germany; Alexander Poschke, IPH-Institut für integrierte Produktion Hannover, Germany
T1-2	THE COGNITIVE SYSTEM FOR DETERMINING THE MAGNETIC CHARACTERISTICS OF HIGH-COERCIVE PERMANENT MAGNETS Valery Korol, Michail Lankin, Platov South-Russian State Polytechnic University (NPI), Novochoerkassk, Rostov region, Russia
T1-3	TIME DIVISION MULTIPLEXING IN MEASUREMENT CIRCUITS OF MULTIDIMENSIONAL OBJECTS Viktor Arbutov, Marina Kalinina, Penza State University, Russia
T1-4	INTEGRATION OF PROGRAMMING LANGUAGES BASED ON SPARK SQL AND SPARK MLLIB IN THE SYSTEM OF PROCESSING LARGE AMOUNTS OF DATA Vitalii Monastirev, Peter the Great St.Petersburg Polytechnic University, Russia
T1-5	QUALITY ASSURANCE IN METAL ADDITIVE MANUFACTURING BY MEANS OF HYPERSPECTRAL IMAGING AND METHODS OF MACHINE LEARNING Niklas Gerdes, Christian Hoff, Jörg Hermsdorf, Stefan Kaierle, Ludger Overmeyer, Laser Zentrum Hannover e.V., Hannover, Germany
T1-6	MODELS OF CYBER-PHYSICAL POLLUTION MINIMIZATION CONTROL SYSTEMS TO ADAPT TECHNOLOGIES TO THEIR SOURCE Gennady Korshunov, Peter the Great St.Petersburg Polytechnic University, Russia; Remir Solnitsev, Saint Petersburg Electrotechnical University "LETI", Russia; Natalia Zhilnikova, Sergey Polyakov, Saint-Petersburg State University of Aerospace Instrumentation, Russia
T1-7	REAL TIME OBJECT DETECTION ALGORITHM Pavel Gessen, Tatyana Leontyeva, Peter the Great St.Petersburg Polytechnic University, Russia
T1-8	BUILDING A DIGITAL TWIN FOR LOCAL HEATING HOUSING SERVICES Viacheslav Shkodyrev, Vladimir Khokhlovskiy, Vitalii Oleinikov, Peter the Great St. Petersburg Polytechnic University, Russia
T1-9	GENERATING SYNTHETIC LABELED DATA OF ANIMATED FISH SWARMS IN 3D WORLDS WITH PARTICLE SYSTEMS AND VIRTUAL SOUND WAVE SENSORS Stefan Reitmann, Bernhard Jung, Freiberg University of Mining and Technology, Germany

## Session “Applications-1”

15:45-18:00

Chairpersons:

Dr. James F. Whidborne, Cranfield University, UK

Dr. Vyacheslav V. Potekhin, Peter the Great St. Petersburg Polytechnic University, Russia,

slava.potekhin@gmail.com

Paper ID	Paper Information
A1-1	APPLYING CYBER-PHYSICAL MANAGEMENT TO THE STRUCTURE OF THE DEMAND RESPONSE AGGREGATOR Elena Korkina, Irina Kolosok, Melentiev Energy Systems Institute, Irkutsk, Russia
A1-2	CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES: PROBLEMS AND DEVELOPMENT PROSPECTS Yury Nurulin, Inga Skvortsova, Olga Kalchenko, Peter the Great St.Petersburg Polytechnic University, Russia
A1-3	A COMPARISON OF TWO ALGORITHMS FOR CONTROL OVER A THREE-LINK ROBOT-MANIPULATOR UNDER THE CONDITIONS OF A DESCRIPTION UNCERTAINTY Svetlana I. Kolesnikova, Saint-Petersburg State University of Aerospace Instrumentation, Russia; Yurii Paraev, Svetlana Tsvetnitskaya, National Research Tomsk State University, Russia
A1-4	CYBER-PHYSICAL SYSTEM FOR TRAINING ASSESSORS TO DETERMINE THE ODOUR THRESHOLD USING THE DYNAMIC OLFACTOMETRY METHOD Viktor Sushnikov, Marina Meshalkina, Irina Moskvina, Peter the Great St.Petersburg Polytechnic University, Russia
A1-5	DEVELOPING A TRAINING PROGRAM BY THE METHOD OF SPACED REPETITION Anatoliy Sergeev, Eugenia Rezedinova, Nikita Vasukov, Peter the Great St.Petersburg Polytechnic University, Russia
A1-6	METHODS AND TECHNOLOGIES FOR DEVELOPING A SOFTWARE SYSTEM THAT PREDICTS ANTIFUNGAL ANTIBIOTICS' PROPERTIES Eldar Musayev, Tamara Chistyakova, Saint Petersburg State Institute of Technology, Russia; Vera Kolodyaznaya, Saint Petersburg State Chemical Pharmaceutical Academy, Russia; Valery Belakhov, Technion – Israel Institute of Technology, Israel
A1-7	SOLVING THE PROBLEM OF SOFTWARE AND HARDWARE IMPLEMENTATION OF A ROBOT CONTROL ALGORITHMS Vladimir Amosov, Alexander Petrov, Anton Tyshkevich, Peter the Great St.Petersburg Polytechnic University, Russia
A1-8	ADAPTIVE ENERGY TURBINE CONTROL Anatolii Loginov, Peter the Great St.Petersburg Polytechnic University, Russia; Matvey Bragin, LLC «PromAutomation», Russia
A1-9	DIGITAL PRODUCT UX RESEARCH WITH FACIAL EXPRESSION RECOGNITION Vladimir Yurkin, Sergei Saradgishvili, Peter the Great St.Petersburg Polytechnic University, Russia

## Session “Education and Social Aspects-1”

15:45-18:00

Chairpersons:

Vladimir V. Platonov, Elena E. Iakovleva, Saint Petersburg State University of Economics, Russia

Dr. Aleksandra Loginova, Peter the Great St.Petersburg Polytechnic University, Russia,

loginova\_av@spbstu.ru

Paper ID	Paper Information
E1-1	APPLICATION EXPERT SYSTEMS IN INNOVATION PROJECT MANAGEMENT Nikita B. Kultin, Peter the Great St.Petersburg Polytechnic University, Russia
E1-2	MODELING THE DECISION-MAKING PROCESS BASED ON CYBER-PHYSICAL TECHNOLOGIES Elena E. Iakovleva, Saint Petersburg State University of Economics, Russia; Natalia S. Voronova, Ermin E. Sharich and Daria D. Iakovleva, Saint Petersburg State University, Russia
E1-3	PREDICTIVE ANALYTICS AND BIG DATA IN INNOVATION MANAGEMENT Dmitry Krasouski, Iosif Tukkel, Peter the Great St.Petersburg Polytechnic University, Russia
E1-4	APPLICATION OF THE METHODOLOGY AND TOOLS OF BAYESIAN INTELLIGENT TECHNOLOGIES AND INTELLIGENT IIOT IN THE MANAGEMENT OF CYBERPHYSICAL SYSTEMS IN CONDITIONS OF UNCERTAINTY Svetlana Prokopchina, Financial University under the Government of the Russian Federation, Russia
E1-5	BLOCKCHAIN TECHNOLOGIES IN THE PERSPECTIVE OF INDUSTRIAL DEVELOPMENT: RESEARCH CHALLENGE Alexander E. Karlik, Vladimir V. Platonov, Elena E. Iakovleva, Saint Petersburg State University of Economics, Russia
E1-6	APPROACHES TO ESTIMATION OF INVESTMENT STRATEGY EFFICIENCY IN CONDITIONS OF THE INSUFFICIENT INFORMATION SUPPLY Anatolii Smetankin, Sergei Efimenko, Dmitry Garanin, Igor Chernorutsky, Peter the Great St. Petersburg Polytechnic University, Russia; Irina Malihina, Vladimir Shilkin, Admiral Makarov State University of Maritime and Inland Shipping, Russia
E1-7	NEW APPROACH IN DESIGN OF A HYBRID COURSE FOR THE PERSONNEL RESERVE TRAINING FOR INTELLIGENT ENTERPRISES Anton Ambrajei, Nikita Golovin, Anna Valyukhova, Natalia Rybakova, Peter the Great St. Petersburg Polytechnic University, Russia; Yury Kupriyanov, LLC SAP CIS, Russia
E1-8	SOME ASPECTS OF PROCESS MANAGEMENT IN SOCIAL NETWORKS Sergiy Yablochnikov, Viktori Erofeeva, Oleg Ilevlev, Moscow technical University of communications and Informatics, Russia; Mikhail Kuptsov, Ryazan State Radio and Technical University, Russia; Irina Yablochnikova, Russian New University, Russia; Valentina Dzobelova, North-Ossetian state University named after K. L. Khetagurov, Russia
E1-9	DEVELOPMENT OF A VIRTUAL TRAINING SIMULATOR OF AN ASSEMBLY MACHINE FOR THE AUTOMOBILE TIRES MANUFACTURING Natalia Staroverova, Marina Shustrova, Albina Halikova, Kazan National Research Technical University, Russia

**Wednesday, 30 June, 2021**

**Special Session “Global Smart Manufacturing” of RWTH Aachen University**

14:25-16:25

Chairpersons:

Dr. Matthias Brockmann, RWTH Aachen University, Germany

Ms. Aleksandra Müller, RWTH Aachen University, Germany

Dr. Vyacheslav Potekhin, Peter the Great St. Petersburg Polytechnic University, Russia,  
slava.potekhin@gmail.com

Paper ID	Paper Information
G-1	ASSESSING COMPLETENESS OF PRODUCTION DATA IN CONTEXT OF PREDICTIVE QUALITY APPLICATIONS Peter Schlegel, Robert H. Schmitt, RWTH Aachen University, Germany
G-2	APPLICATION OF AI METHODS FOR THE DESIGN AND OPTIMIZATION OF PASS SCHEDULES IN HOT ROLLING Christian Idzik, Gerhard Hirt, Johannes Lohmar, RWTH Aachen University, Germany
G-3	COGNITIVE SYSTEM BASED ON CONSENSUS OF MULTI AGENT SYSTEM FOR INTELLIGENT CONTROL SYSTEM IN OIL MANUFACTURING Hanafi Mohamed Yassine, Lotfi Zarour, Viacheslav Shkodyrev, Peter the Great St. Petersburg Polytechnic University, Russia
G-4	MAPPING APPLICATION ONTOLOGIES AS A GATEWAY INTO OBDA SYSTEMS IN THE INTERNET OF PRODUCTION Aleksandra Müller, Christian Brecher, Thomas Nauck, Simon Storms, RWTH Aachen University, Germany
G-5	INTEGRATED PROCESS PLANNING SCHEDULING IN DIGITAL TWINS ERA Hend Reda, Badr University in Cairo (BUC), Egypt; Mohamed Awad, Ain Shams University (ASU), Egypt
G-6	DEVELOPMENT AND PRODUCTION OF TRAINING NETWORK SMART CONTROL SYSTEMS Vyacheslav Potekhin, Daniil Lyadskiy, Alexey Molchanov, Pavel Smirnov, Egor Kuklin, Egor Cherkashin, Peter the Great St. Petersburg Polytechnic University, Russia; Dimitri Galayko, Sorbonne University, France
G-7	QUALITY CONTROL IN CYBER-PHYSICAL SYSTEMS OF SMART ELECTRONICS MANUFACTURING Gennady Korshunov, Peter the Great St. Petersburg Polytechnic University, Russia; Anastasiya Petrushevskaya, Saint-Petersburg State University of Aerospace Instrumentation, Russia
G-8	ARTIFICIAL INTELLIGENCE METHODS AS THE BASIS OF INDUSTRIAL TECHNOLOGIES OF CYBER-PHYSICAL SYSTEMS Aleksandra Dashkina, Aleksandra Kobicheva, Tatiana Lazovskaya, Galina Malykhina, Viacheslav Shkodyrev, Dmitriy Tarkhov, Peter the Great St. Petersburg Polytechnic University, Russia

## Session “Fundamentals-2”

14:25-16:25

Chairpersons:

Professor Nikolay V. Kuznetsov, Saint-Petersburg State University, IPME RAS, Russia

Dr. Konstantin Semenov, Peter the Great St.Petersburg Polytechnic University, Russia,

semenov.k.k@gmail.com

Paper ID	Paper Information
F2-1	COMBINED NONLINEAR CONTROL SYSTEM FOR INVERTED PENDULUMS WITH INPUT SATURATION Evgeniy Shelenok, Pacific National University, Russia; Larisa Nikiforova, Eugenie Eremin, Amur State University, Russia
F2-2	CONTROL OF PLANE POISEUILLE FLOW USING THE KREISS CONSTANT Pierre Quénon, James Whidborne, Cranfield University, UK
F2-3	MODIFICATIONS OF SHAP FOR LOCAL EXPLANATION OF FUNCTION-VALUED PREDICTIONS USING THE DIVERGENCE MEASURES Lev Utkin, Artem Petrov, Andrei Konstantinov, Peter the Great St. Petersburg Polytechnic University, Russia
F2-4	ANYDYNAMICS – A NEW UNIVERSAL TOOL FOR MODELING AND SIMULATION COMPLEX DYNAMICAL SYSTEMS Yuri Senichenkov, Peter the Great St. Petersburg Polytechnic University, Russia; Yuri Kolesov, MvSoft, Russia
F2-5	ROBUST MODELS OF DISTANCE METRIC LEARNING BY INTERVAL-VALUED TRAINING DATA Lev Utkin, Andrei Konstantinov, Dmitry Baskakov, Vladimir Muliukha, Natalia Politava, Peter the Great St. Petersburg Polytechnic University, Russia
F2-6	MEASURED DATA RECONCILIATION PROCESSED WITHIN NONLINEAR CONSTRAINTS MODELS IN CYBER-PHYSICAL SYSTEMS Vladimir Garanin, Konstantin Semenov, Peter the Great St.Petersburg Polytechnic University, Russia
F2-7	INTRASYSTEM INTERACTIONS IN OPEN SYSTEMS Boris F. Fomin, Peter the Great St.Petersburg Polytechnic University, Russia; Oleg B. Fomin, Tamara L. Kachanova, St. Petersburg Electrotechnical University “LETI”, Russia
F2-8	SOLVING FUZZY EQUATIONS BASED ON FUZZY INTERVAL BISECTION METHOD FOR INTELLIGENT DATA PROCESSING IN CYBER-PHYSICAL SYSTEMS Konstantin Semenov, Anastasiia Tselishcheva, Peter the Great St.Petersburg Polytechnic University, Russia

## Session “Technologies-2”

14:25-16:25

Chairpersons:

Professor Vladimir A. Polyansky, Institute of the Problems of Mechanical Engineering of the Russian Academy of Sciences, Russia

Dr. Nikita Voinov, Peter the Great St. Petersburg Polytechnic University, Russia,

voinov\_nv@spbstu.ru

Paper ID	Paper Information
T2-1	LASER DRILLING AND SINTERING OF VERTICAL INTERCONNECT ACCESSES FOR 3D MULTILAYER ELECTRONICS Ejvind Olsen, Johan Stelling, Ludger Overmeyer, Leibniz University Hanover, Germany

Paper ID	Paper Information
T2-2	EDEN: DEEP FEATURE DISTRIBUTION POOLING FOR SAIMAA RINGED SEALS PATTERN MATCHING Iliia Chelak, Peter the Great St.Petersburg Polytechnic University, Russia; Ekaterina Nepovinnykh, Tuomas Eerola, Heikki Kälviäinen, Lappeenranta-Lahti University of Technology LUT, Finland
T2-3	DIGITAL MODEL FOR FORECASTING THE MAXIMUM POWER CONSUMPTION OF ENERGY REGION Oleg Russkov, Sergei Saradgishvili, Peter the Great St.Petersburg Polytechnic University, Russia
T2-4	SCHEDULING MIXED-CRITICALITY REAL-TIME APPLICATIONS IN THE SAFETY-INVOLVED SYSTEM Elena Dushutina, Peter the Great St.Petersburg Polytechnic University, Russia
T2-5	SOFTWARE ENGINEERING PRINCIPLES APPLY TO ARTIFICIAL INTELLIGENCE SYSTEMS Dmitry Baskakov, Dmitry Arseniev, Viacheslav Shkodyrev, Peter the Great St. Petersburg Polytechnic University, Russia; Alexey Mergasov, Central Bank of Russia, Head of Payment System Department, Russia; Jussi Kasurinen, Lappeenranta-Lahti University of Technology LUT, Lappeenranta, Finland
T2-6	LICENSE PLATES DETECTION AND RECOGNITION BASED ON SEMI-SUPERVISED LEARNING Ali Aliyev, Sergey Molodyakov, Nikita Voinov, Peter the Great St. Petersburg Polytechnic University, Russia
T2-7	A PROPOSAL FOR IMPROVEMENT OF SMOKE DETECTORS David Schepers, Sarah Schwarzer, Hochschule Ruhr West, Germany
T2-8	MULTI-SENSOR CAMERA BASED ON ARM+FPGA SOC Vladimir Vasiliev, Igor Bronshtein, STC "Optical-information technologies and systems" ITMO University, St. Petersburg, Russia; Sergei Kruglov, Fedor Inochkin, Peter the Great St. Petersburg Polytechnical University, Russia

## Special Session "Data-Driven and Proactive Control in CPS" of St. Petersburg Federal Research Center of the Russian Academy of Sciences

16:35-18:50

Chairpersons:

Professor Sergey V. Kuleshov, St. Petersburg Federal Research Center of the Russian Academy of Sciences, Russia

Dr. Alexandra A. Zaytseva, St. Petersburg Federal Research Center of the Russian Academy of Sciences, Russia,

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Paper ID	Paper Information
D-1	METHODOLOGY AND TECHNOLOGY FOR USE AND DEVELOPMENT OF INFORMATION-ANALYTIC PLATFORM FOR COMPLEX OBJECT LIFE CYCLE PROACTIVE CONTROL Boris Sokolov, Mikhail Okhtilev, Dmitrii Murashov, Aleksey Krylov, Oleg Kofnov, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Russia; Pavel Stepanov, Mark Styskin, CJSC Universal-Aero, Russia
D-2	CORPORATE INFORMATION SYSTEM MODERNIZATION DURING ENTERPRISE DIGITAL TRANSFORMATION Valerii Zakharov, Stanislav Mikoni, Vladimir Salukhov, Alexandra Zaytseva, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Russia



Paper ID	Paper Information
D-3	PLANNING TRAJECTORIES FOR A ROBOT MANIPULATOR WITH TOOL ORIENTATION IN SEMIAUTOMATIC CONTROL SYSTEMS Ekaterina Rostova, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Russia; Nikolay Rostov, Peter the Great St.Petersburg Polytechnic University, Russia
D-4	EXPERT KNOWLEDGE AS "INTELLIGENT MEASUREMENT-DIAGNOSTIC SYSTEM" Vasily Spesivtsev, Aleksandr Spesivtsev, Sergey Kuleshov, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Russia
D-5	ONTOLOGICAL AND FUZZY-POSSIBILITY APPROACH TO THE SYNTHESIS OF THE DM FUNCTIONAL EQUIVALENT FOR MANAGEMENT OF HIERARCHICAL SYSTEMS Igor Kimyaev, LLC IC "Sibintek", Moscow, Russia; Aleksandr Spesivtsev, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Russia
D-6	APPROACH TO PROCESSING OF THE NEWS FEEDS Alexandra Zaytseva, Sergey Kuleshov, Alexey Aksenov, St. Petersburg Federal Research Center of the Russian Academy of Sciences (SPC RAS), Russia
D-7	EVALUATING THE CRITICALITY OF THE ADAPTIVE SUPPLY CHAIN ELEMENTS FAILURES IN THE CONTEXT OF DYNAMIC CUSTOMER ORDERS Aleksandr Pavlov, Dmitry Pavlov, Aleksandr Umarov, Yevgeny Aleshin, Mozhaisky Military Aerospace Academy St.Petersburg, Russia
D-8	DISCRETE EVENT-BASED BEHAVIOR MODEL FOR GROUP OF GROUND-BASED MOBILE ROBOTS CONTROL TO SEARCH AND ELIMINATE IONIZING RADIATION SOURCES Artem Kulichenko, Peter the Great St.Petersburg Polytechnic University, Russia; Ekaterina Smirnova, Russian State Scientific Center for Robotics and Technical Cybernetics

## Session “Applications-2”

16:35-18:50

Chairpersons:

Professor Professor Vyacheslav P. Shkodyrev, Peter the Great St. Petersburg Polytechnic University, Russia

PhD Candidate Lotfi Zarour, Peter the Great St.Petersburg Polytechnic University, Russia,

lotfi.zarour.92@gmail.com

Paper ID	Paper Information
A2-1	FRACTIONAL REGULATING IMPLEMENTATION IN DIGITAL CONTROL SYSTEMS Anton Ivaschenko, Samara State Technical University, Russia; Alexandr Avsievich, Vladimir Avsievich, Samara State Transport University, Russia; Mikhail Shcherbakov, Penza State University, Russia
A2-2	GAMMA RAY DETECTION SIMULATION IN CASE OF NON-DESTRUCTIVE MULTIPHASE OIL WELL FLOW MEASUREMENT Lotfi Zarour, Galina F. Malykhina, Yassine M. Hanafi, Peter the Great St.Petersburg Polytechnic University, Russia
A2-3	STUDY AND EFFICIENCY ANALYSIS OF WIRELESS SENSOR NETWORKS BASED ON THE IEEE 802.15.4 / ZIGBEE PROTOCOL Farah Yousef, Sergey Sosenushkin, MSUT Stankin, Moscow, Russia

Paper ID	Paper Information
A2-4	MUTATION TESTING OF SOFTWARE QUALITY ON THE SYSTEM-LEVEL Dmitry Baskakov, Dmitry Arseniev, Viacheslav Shkodyrev, Peter the Great St. Petersburg Polytechnic University, Russia; Alexey Mergasov, Central Bank of Russia, Head of Payment System Department, Russia; Jussi Kasurinen, Lappeenranta-Lahti University of Technology LUT, Lappeenranta, Finland
A2-5	MULTICLASS CLASSIFICATION OF DIAMOND CRYSTALS USING CONVOLUTIONAL NEURAL NETWORKS Mikhail Miae, Galina Malykhina, Peter the Great St.Petersburg Polytechnic University, Russia
A2-6	SERIAL NONLINEAR CORRECTION METHOD IN THE FLIGHT VEHICLE SYSTEMS Iuliia Zaitceva, Boris Andrievsky, Institute of Problems of Mechanical Engineering, Russian Academy of Sciences (IPME RAS), St. Petersburg, Russia
A2-7	TRACKING OF DRIVER BEHAVIOUR AND DROWSINESS IN ADAS Oleg Evstafev, Sergey Shavetov, ITMO University
A2-8	STUDY ON ALCOHOL CONSUMPTION AMONG YOUNG PEOPLE IN SUCEAVA COUNTY, ROMANIA Mihaela Jarcău, Maria Poroch Serițan, Ștefan cel Mare University, Romania; Matei Jarcău, Iuliu Hațieganu University of Medicine and Pharmacy, Romania
A2-9	TRACING SITES REQUESTS IN USING WEB APPLICATIONS Anatoliy Sergeev, Eugenia Rezedinova, Karina Ihsanova, Peter the Great St.Petersburg Polytechnic University, Russia

## Session “Education and Social Aspects-2”

16:35-18:50

Chairpersons:

Dr. Tatiyna Its, Peter the Great St. Petersburg Polytechnic University, Russia,

its7654321@yandex.ru;

PhD Candidate Iuliia Shnai, Lappeenranta University of Technology, Finland

Paper ID	Paper Information
E2-1	MANAGEMENT OF MIGRATION FLOWS OF A MEGAPOLIS AS A CYBER-PHYSICAL SYSTEM Tatiyna Its, Sergey Redko, Alena Its, Alla Surina, Peter the Great St.Petersburg Polytechnic University, Russia
E2-2	PROJECT-BASED APPROACH TO STRENGTHENING COOPERATION BETWEEN HIGHER EDUCATION AND BUSINESS IN THE CONTEXT OF THE DIGITAL Olga Vasilieva, Yuliya Alekseeva, Sergey Redko, Peter the Great St.Petersburg Polytechnic University, Russia
E2-3	ADVANCED TECHNOLOGIES MAKE REMOTE TERRITORIES SMART: NETWORK-BASED SCOPE Maria Kuklina, Andrey Trufanov, Irkutsk National Research Technical University, Russia; Natalya Krasnoshtanova, Victor Bogdanov, V.B. Sochava Institute of Geography SB RAS, Russia; Alexei Tikhomirov, Inha University, South Korea; Zolzaya Dashdorj, Mongolian University of Science and Technology, Mongolia
E2-4	CLUSTERING AND ANALYSIS OF THE PARTICIPANTS’ RESULTS AND COMPLETED TEST TASKS ON MASSIVE OPEN ONLINE COURSE Sergey Nesterov, Victoria Sazhnova, Elena Smolina, Peter the Great St.Petersburg Polytechnic University, Russia

Paper ID	Paper Information
E2-5	<p>TOWARD A NOVEL NEUROSCIENCE-BASED SYSTEM APPROACH INTEGRATING COGNITIVE AND IMPLICIT LEARNING IN EDUCATION</p> <p>Nadezhda Tsvetkova, Peter the Great St.Petersburg Polytechnic University, Russia;  Dante Jorge Dorantes-Gonzalez, Tuna Çakar, MEF University, Turkey;  Svetlana Veledinskaya, Tomsk State University, Russia;  Olesya Babanskaya, Tomsk State University of Control Systems and Radioelectronics, Russia</p>
E2-6	<p>FLIPPED LEARNING APPROACH IN HIGHER EDUCATION: KEY PRINCIPLES AND INDICATORS FOR INDIVIDUAL AND GROUP SPACE</p> <p>Inna Seledtsova, Sergey Redko, Peter the Great St.Petersburg Polytechnic University, Russia</p>
E2-7	<p>ARE TEACHERS READY FOR DIGITALIZATION AND HOW TO MAKE THEIR TRIP SMOOTH?</p> <p>Iuliia Shnai, Lappeenranta University of Technology, Finland</p>
E2-8	<p>DIGITAL TWINS IN GAS AND OIL SECTOR: ARCHITECTURE AND ECONOMIC EFFECTS</p> <p>Anastasia Levina, Igor Ilin, Daria Levaniuk, Peter the Great St. Petersburg Polytechnic University, Russia;  Manfred Esser, GET Information Technology, Germany</p>

**Thursday, 1 July, 2021**

**Special Session “Neural Networks”**

15:50-18:05

Chairpersons:

Professor Dmitriy A. Tarkhov, Peter the Great St. Petersburg Polytechnic University, Russia

Ms. Tatiana Lazovskaya, Peter the Great St. Petersburg Polytechnic University, Russia,

lazovskaya\_tv@spbstu.ru

Paper ID	Paper Information
N-1	CAPABILITIES OF CONTROLLING THE OCCURRENCE AND PROGRESSION OF CARDIOVASCULAR DISEASES BY THE METHOD OF NEURAL NETWORK MODELING Leonid Yasnitskiy, Perm State University, Russia; Andrew Dumler, Perm State Medical University, Russia; Fedor Cherepanov, Perm State University of Humanities and Education, Russia
N-2	A NEW APPROACH FOR DIAGNOSING PLANT DISEASES BASED ON 3D DIGITAL DESCRIPTIONS OF LEAF IMAGES AND NEURAL NETWORK Oleg Prokofiev, Vladimir Tutygin, Sergey Molodyakov, Peter the Great St. Petersburg Polytechnic University, Russia; Basim Al-Windi, Al-Mustansiriya Universituy, Iraq
N-3	SYNTHESIS OF DATASETS FOR NEURAL NETWORKS BASED ON EXPERT KNOWLEDGE Andrey Rabchevsky, JSC “SEUSLAB”, Perm, Russia; Leonid Yasnitsky, Perm State University, JSC “SEUSLAB”, Perm, Russia; Eugeny Ashikhmin, Perm State University, Russia
N-4	TOOL WEAR IDENTIFICATION AND COMPENSATION BASED ON ARTIFICIAL NEURAL NETWORK IN MILLING Oleg Shagniev, Serafim Bulov, Peter the Great St. Petersburg Polytechnic University, Russia
N-5	THE METHOD OF STRUCTURAL ADAPTATION OF THE COMPARTMENTAL SPIKING NEURON MODEL Anton Korsakov, Lyubov Astapova, Russian state scientific center for robotics and technical cybernetics (RTC), St. Petersburg, Russia; Aleksandr Bakhshiev, Peter the Great St.Petersburg Polytechnic University, Russia
N-6	DEVELOPMENT OF SPIKING NEURAL NETWORKS BASED ON NEURON MODEL USING NEURO-FUZZY BASIS Ivan Smolyakov, Lev Stankevich, Peter the Great St.Petersburg Polytechnic University, Russia
N-7	POLYNOMIAL NEURAL NETWORK APPROXIMATION OF DUFFING EQUATION SOLUTION Tatiana Lazovskaya, Galina Malykhina, Dmitriy Pashkovskiy, Dmitriy Tarkhov, Peter the Great St. Petersburg Polytechnic University, Russia
N-8	THE PROBLEM OF BIAS IN ARTIFICIAL INTELLIGENCE IN THE CONTEXT OF THE NEURAL NETWORK TRAINING Polina Tumanyan, Sergei Saradgishvili, Peter the Great St. Petersburg Polytechnic University, Russia
N-9	HANDWRITTEN LETTERS OF ENGLISH ALPHABET RECOGNITION USING NEURAL NETWORKS Sergey Tikhov, Moscow Technical University of Communications and Informatics, , Russia

## Special Session “Cybersecurity” of the Institute of Cybersecurity, Peter the Great St. Petersburg Polytechnic University

15:50-18:05

Chairpersons:

Professor Dmitry Zegzhda, Peter the Great St. Petersburg Polytechnic University, Russia

Dr. Evgeny Pavlenko, Peter the Great St. Petersburg Polytechnic University, Russia,

pavlenko\_eyu@spbstu.ru

Paper ID	Paper Information
C-1	<p>CYBERSECURITY INCIDENT PREDICTION MODEL IN CYBER-PHYSICAL SYSTEMS</p> <p>Aleksandr Suprun, Peter Zegzhda, Dmitry Zegzhda, Vladimir Anisimov, Peter the Great St. Petersburg Polytechnic University, Russia; Evgeniy Anisimov, Tatyana Saurenko, Peoples Friendship University of Russia (RUDN University), Moscow, Russia</p>
C-2	<p>LORAWAN REPLAY ATTACK DETECTION METHOD</p> <p>Anton Shmakov, Ekaterina Shmakova, Elizaveta Stepanova, Polina Ashaeva, Omsk Scientific-Research Institute of Instrument Engineering (JSC ONIIP), Russia</p>
C-3	<p>CYBER-ATTACKS AND PROTECTION METHODS FOR NEURAL NETWORKS IN CYBER-PHYSICAL SYSTEMS</p> <p>Alexey Nemchenko, ITMO University, St. Petersburg, Russia; Sergey Bezzateev, Saint Petersburg University of Airspace Instrumentation, Russia; Petr Zegzhda, Peter the Great St. Petersburg Polytechnic University, Russia</p>
C-4	<p>ANALYSIS OF APPROACHES TO THE GENERATION OF SYNTHETIC DATA TO INCREASE THE ACCURACY OF DETECTING NETWORK ATTACKS ON THE INTERNET OF THINGS</p> <p>Tigran Ovasapyan, Vladislav Danilov, Dmitry Moskvina, Peter the Great St. Petersburg Polytechnic University, Russia</p>
C-5	<p>NEUROEVOLUTIONARY APPROACH TO ENSURING THE SECURITY OF CYBERPHYSICAL SYSTEMS</p> <p>Alexander Fatin, Evgeny Pavlenko, Dmitry Zegzhda, Peter the Great St. Petersburg Polytechnic University, Russia</p>
C-6	<p>DATA TRUST IN HIERARCHICAL DYNAMIC IIOT SYSTEMS</p> <p>Elena Aleksandrova, Yarmak Anastasya, Peter the Great St. Petersburg Polytechnic University, Russia</p>
C-7	<p>SECURITY THREATS TO INTENT-BASED NETWORKS IN CYBER-PHYSICAL SYSTEMS</p> <p>Elena Popova, Daria Lavrova, Peter the Great St. Petersburg Polytechnic University, Russia</p>
C-8	<p>GRAPH MODEL FOR CYBER-PHYSICAL SYSTEMS SECURITY</p> <p>Elena Aleksandrova, Anna Shtyrkina, Peter the Great St. Petersburg Polytechnic University, Russia</p>

## Session “Applications-3”

15:50-18:05

Chairpersons:

Professor Branko Katalinic, DAAAM International Vienna, Austria

Dr. Aleksandra Loginova, Peter the Great St.Petersburg Polytechnic University, Russia,

loginova\_av@spbstu.ru

Paper ID	Paper Information
A3-1	FORMATION AND USE OF INTELLIGENT DECISION SUPPORT SYSTEM IN LOGISTICS SYSTEMS Yury Iskanderov, Alexandra Svistunova, Dmitry Khasanov, St. Petersburg Federal Research Center of the Russian Academy of Sciences, Russia
A3-2	NUMERICAL SIMULATION OF THE BEHAVIOR OF A CYBERPHYSICAL AGENT AS A MESSAGE QUEUING SYSTEM Rashit Nasyrov, Ufa State Aviation Technical University
A3-3	COMPUTER VISION BASED ANALYSIS FOR FUSED FILAMENT FABRICATION USING A G-CODE VISUALIZATION COMPARISON Fabian Schindler, Mohamed Aburaia, Maximilian Lackner, Kemajl Stuja, UAS Technikum Vienna, Austria; Branko Katalinic, DAAAM International Vienna, Austria
A3-4	CACHING DATA IN A WEB AUDIO SERVICE USING PROGRESSIVE WEB APPS TECHNOLOGIES Lev Karavashkin, Sergey Molodyakov, Boris Medvedev, Peter the Great St. Petersburg Polytechnic University, Russia
A3-5	USING ACTOR-NETWORK THEORY TO UNDERSTAND INTELLIGENT SYSTEMS: THE CASE OF INTELLIGENT IS FOR LOGISTICS Yury Iskanderov, Dmitry Khasanov, Alexandra Svistunova, St. Petersburg Federal Research Center of the Russian Academy of Sciences, Russia; Mikhail Pautov, Fosco Group, Cyprus
A3-6	DEVELOPMENT OF A SYSTEM FOR CALCULATING THE CORRELATION BETWEEN BLINK ATTRIBUTES AND ATTENTION CHARACTERISTICS Anna Polikarpova, Alexander Samochadin, Peter the Great St. Petersburg Polytechnic University, Russia
A3-7	A COMPARISON OF DIFFERENT LOSS COMPUTATIONS IN SIAMESE NETWORKS FOR AUTHORSHIP VERIFICATION Ayla Gülcü, İsmail Taha Samed Özkan, Osman Furkan Karakuş, Fatih Sultan Mehmet Vakif University, Istanbul, Turkey
A3-8	THE DESIGN FRAMEWORK FOR MULTI-AGENT REAL-TIME CONTROL SYSTEMS Elena Dushutina, Peter the Great St. Petersburg Polytechnic University, Russia