INTELS 2020

14th International Symposium

Intelligent Systems 2020

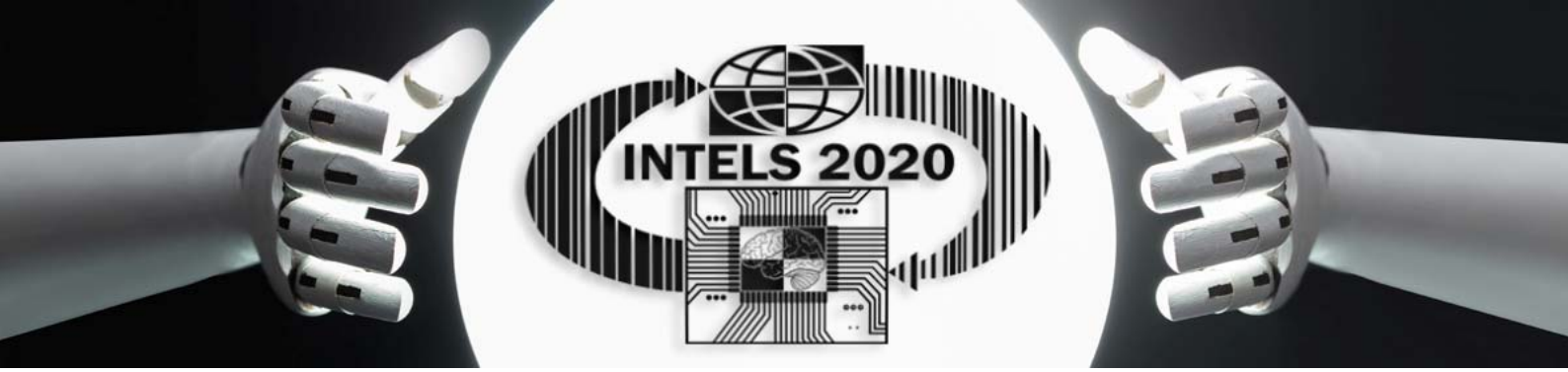
December 14-16, 2020
Moscow, Russia

PLENARY LECTURES AND TECHNICAL PROGRAM

LOMONOSOV MOSCOW STATE UNIVERSITY

ETU THE FIRST ELECTROTECHNICAL UNIVERSITY

Federal Research Center Computer Science and Control of Russian Academy of Sciences



14th International Symposium Intelligent Systems 2020

December 14 – 16, 2020

AGENDA

DAY 1 – 14 December 2020 (Monday)

13:00
Opening Ceremony

13:15
Plenary Lectures

13:15
Plenary Keynote 1

14:00
Plenary Keynote 2

14:50 – 15:20
Break

15:20
Technical Sessions

15:20 TS 1	15:20 TS 2	15:20 TS 3 part 1

19:00
End of the Day 1

DAY 2 – 15 December 2020 (Tuesday)

12:00
Day 2 Welcome

12:05
Plenary Lectures

12:05
Plenary Keynote 3

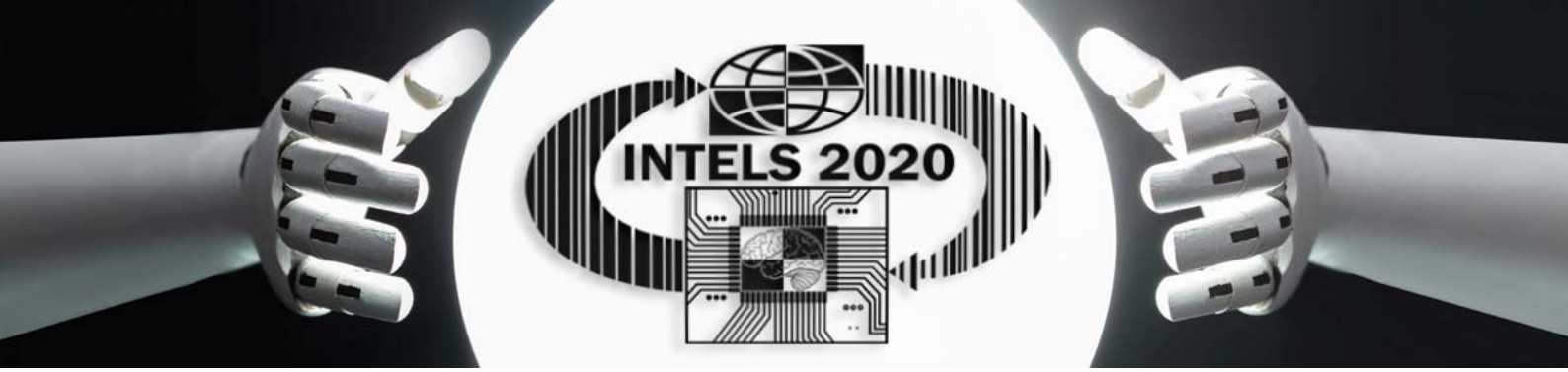
12:45 – 13:45
Break

13:45
Plenary Keynote 4

14:20
Technical Sessions

14:20 TS 3 part 2	14:20 TS 4	14:20 TS 5	14:20 TS 6

18:00
Closing Ceremony



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prof. Kurzhanski A.B.	RAS member, Lomonosov Moscow State University, D.Sc., Russia

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prof. Pereira F.L.	University of Porto, Portugal

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Chadli Mohammed	University Paris-Saclay, IBISC Lab-UEVE, France
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Das Swagatam	India Statistical Institute, India
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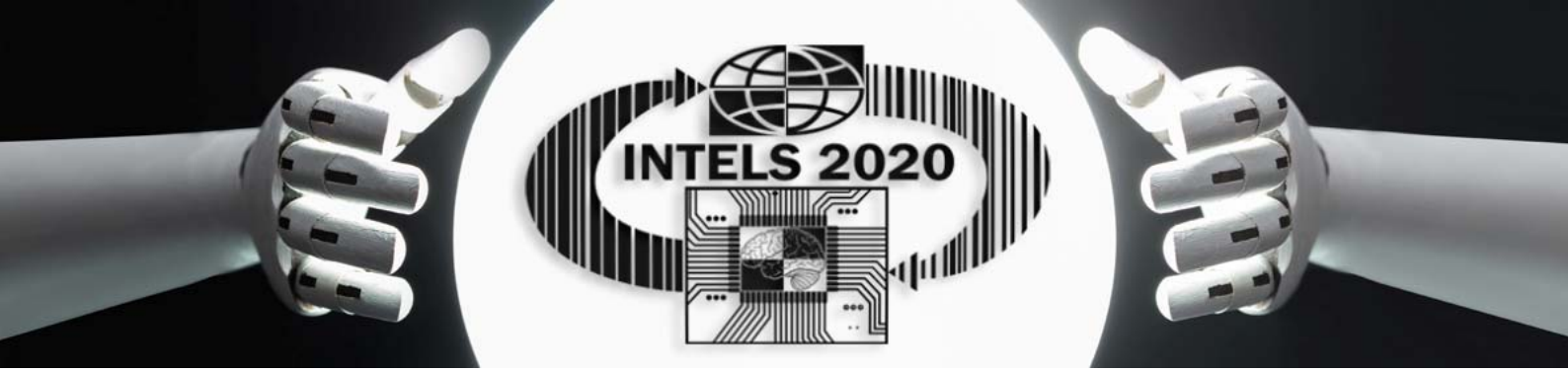

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Serov V.A.	MIREA – Russian Technological Institute, D.Sc., Russia
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Sofronova E.A.	Federal Research Center “Computer science and control” of Russian Academy of Sciences, PhD, Russia
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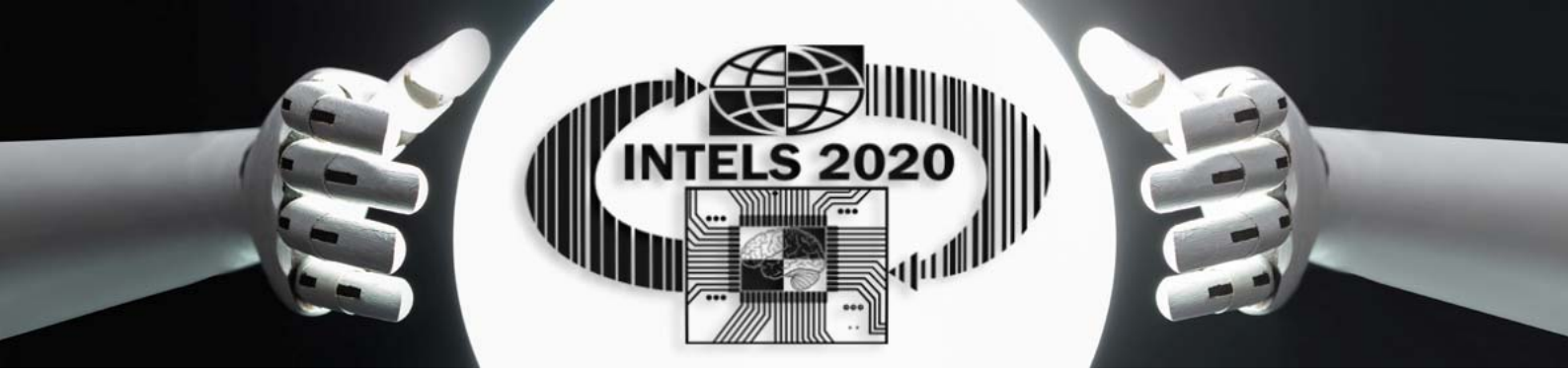
Sopov E.A.	Siberian Institute of Applied System Analysis named after A.N. Antamoshkin, Ph.D., Russia



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Zhabko A.P.	St. Petersburg State University, D.Sc., Russia

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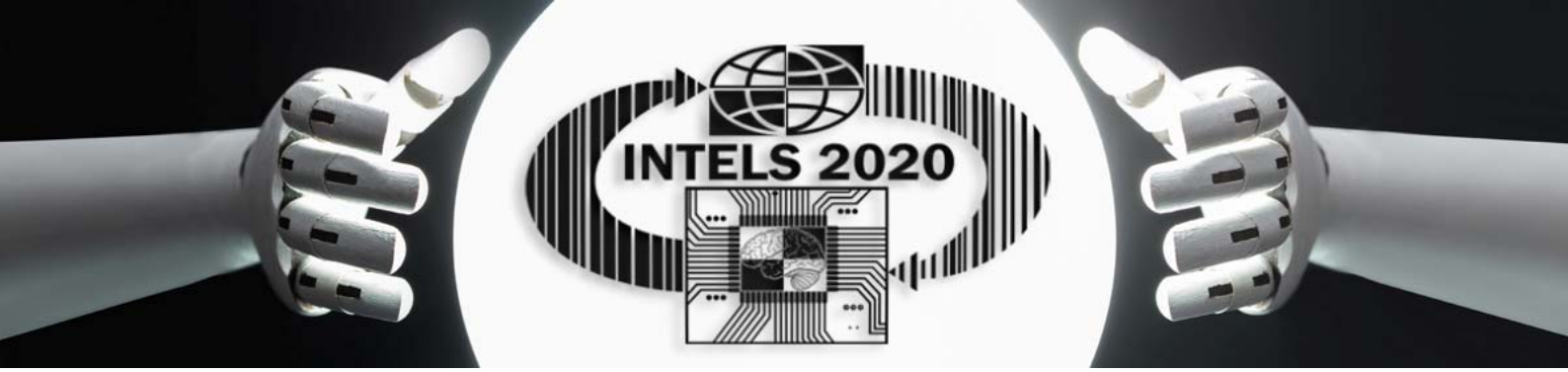
Atamas E.I.	Lomonosov Moscow State University, PhD, Russia
Maltseva A.V.	Lomonosov Moscow State University, Russia
Tochilin P.S.	Lomonosov Moscow State University, PhD, Russia
Vostrikov I.V.	Lomonosov Moscow State University, PhD, Russia
Artemyeva L.A.	Lomonosov Moscow State University, PhD, Russia
Dryazhenkov A.A.	Lomonosov Moscow State University, PhD, Russia
Sofronova E.A.	Federal Research Center “Computer science and control” of Russian Academy of Sciences, PhD, Russia
Daryina A.N.	Federal Research Center “Computer science and control” of Russian Academy of Sciences, PhD, Russia
Kazaryan D.E.	RUDN University, Russia
Konstantinov S.V.	RUDN University, Russia



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OPENING CEREMONY

WELCOME MESSAGE FROM THE DEAN OF CMC MSU

Igor Sokolov
Dr. Sc., Professor, Academician of RAS
Dean of the Faculty of Computational Mathematics and Cybernetics MSU

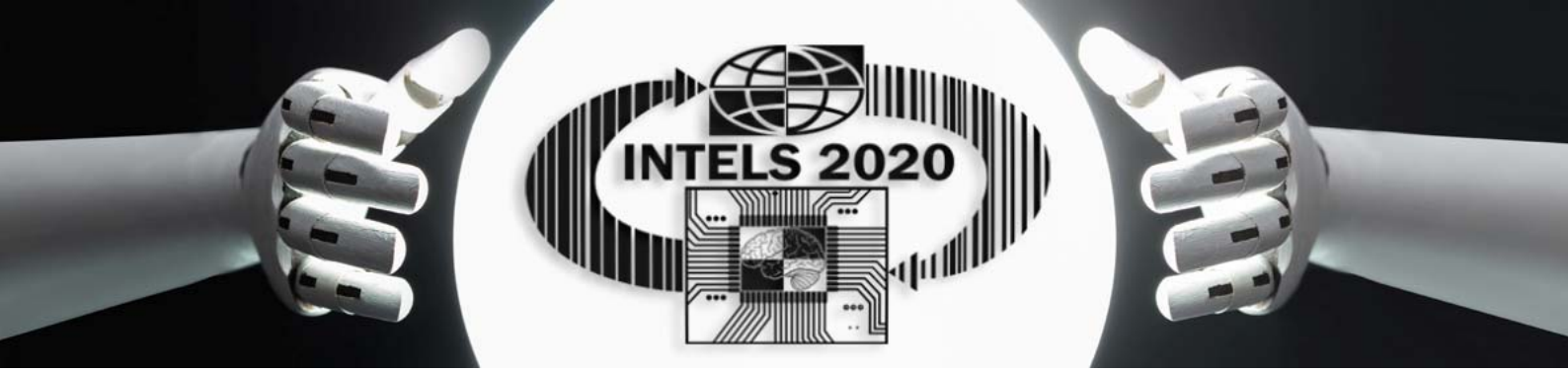
WELCOME MESSAGE FROM GENERAL CHAIR

Askhat Diveev
Dr. Sc., Professor
INTELS'20 General Chair

IN MEMORY OF PROFESSOR KONSTANTIN PUPKOV

In memory of the Symposium founder, Professor Konstantin Pupkov

by Askhat Diveev



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PLENARY LECTURES

KEYNOTE 1

Optimal Control Problems Arising in Drone Missions for Disaster Search and Rescue Operations

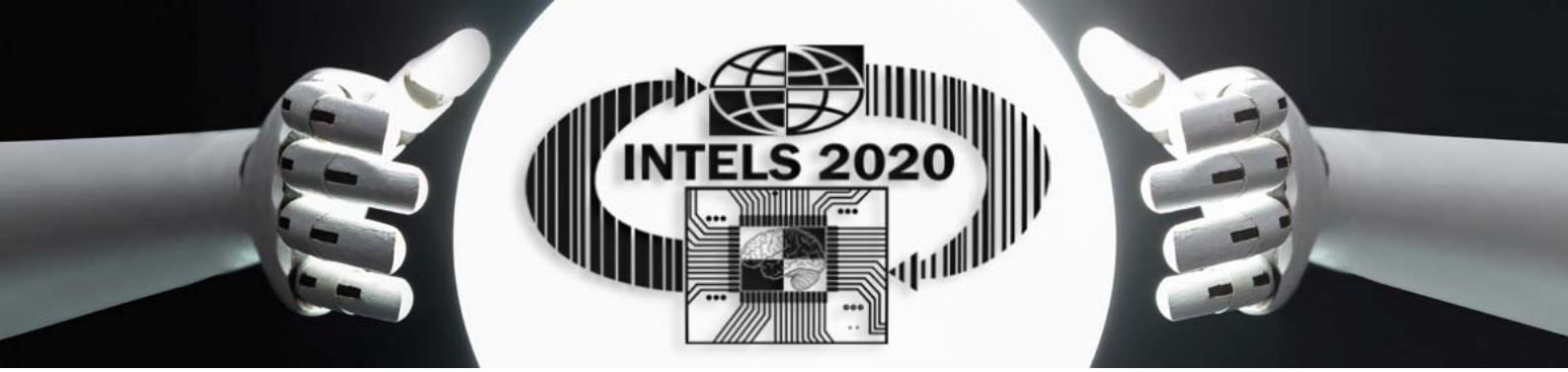
Prof. Fernando Manuel Ferreira Lobo Pereira
University of Porto, Institute for Systems and Robotic
Porto, Portugal

14 December 2020 (Monday)
Starts at 13:15

A fast growing demand of Systems of Autonomous Robotic Vehicles is being generated by the need to address the transformational challenges human kind is facing. These span a wide range of areas covering all the facets of the sustainable evolution of human societies: management of natural resources to supply food, manufacturing production, health safety, impact mitigation and recovery from disaster (both natural and human-made), security and defense. Networks involving fixed nodes and heterogeneous – air, surface, and underwater – mobile platforms endowed with a wide diversity of sensors and actuation devices are required in order to get enough data to acquire proper situational awareness, and deploy a purpose-driven intervention in the sequel of decision-making process – possibly, including a deliberative component – fed by the available pertinent data and a priori knowledge.

SYSTEC – Research Center for Systems and Technologies (http://systec.fe.up.pt) of Faculty of Engineering of Porto University has, over the years, been devoting a very significant R&D effort to the advancement of theoretical research in systems and control, as well as technologies to design and build such systems.

In this talk, as a motivation, we will focus on some key optimal control problems arising in the development of drone systems to support search and rescue operations in the aftermath of disasters, such as earthquakes, floods, tsunamis, extremal weather events, among others. More precisely, we focus on issues arising in multiple drone systems to support communications and situational awareness for first responders in the aftermath of the event that triggered a disaster, in order to promote the agility and effectiveness of the response. This is of utmost importance to mitigate the impact



of the destruction and, in particular, the loss of life. After describing two key operation scenarios, we point out challenges arising in communications and control, and outline a systems design framework leading to the formulation of the required multiple optimal motion control problems, most of which feature state constraints. Then, a Pontryagin maximum principle in the Gamkrelidze form is presented. Under certain regularity assumptions, its measure multiplier is continuous, and, thus, amenable to the formulation of an effective computational indirect method. The shooting algorithmic implementation of this method is easily parallelizable and, as such, adequate for state constrained optimal control problems with real-time constraints. Feedback control strategies to compensate for motion disturbances, on the one hand, and optimization over multiple concatenated modes of operations - often entailing different models - are obtained by embedding the procedure to solve the optimal control in a receding horizon framework of the model predictive control type.

BIO: Prof. Fernando Manuel Ferreira Lobo Pereira

Fernando Manuel Ferreira Lobo Pereira is a Full Professor at Porto University, Faculty of Engineering, Electrical and Computer Engineering Department, Director of the Institute for Systems and Robotic Porto, Scientific Coordinator of FCT R&D unit SYSTEC.

Academic degrees, fields of study, awarding institutions, dates in reverse chronological order: Received the Habilitation ("Agregação") title from Porto University in 1997; Received the PhD in Control Theory from Imperial College of Science and Technology, London University, in 1986; Graduated in Electrical Engineering, Automation and Control at the Faculty of Engineering of Porto University in 1981.

Main scientific and technical area of research: Control and Optimization Theories (Non-smooth Analysis, Dynamic Optimization, and Impulsive Control), Hybrid Systems, and Coordinated Control, and their application in the control of autonomous and/or networked systems arising mainly in multiple robotic vehicle systems. The main application areas are: oceanography, and environment monitoring and surveillance, as well as data gathering for scientific marine research.

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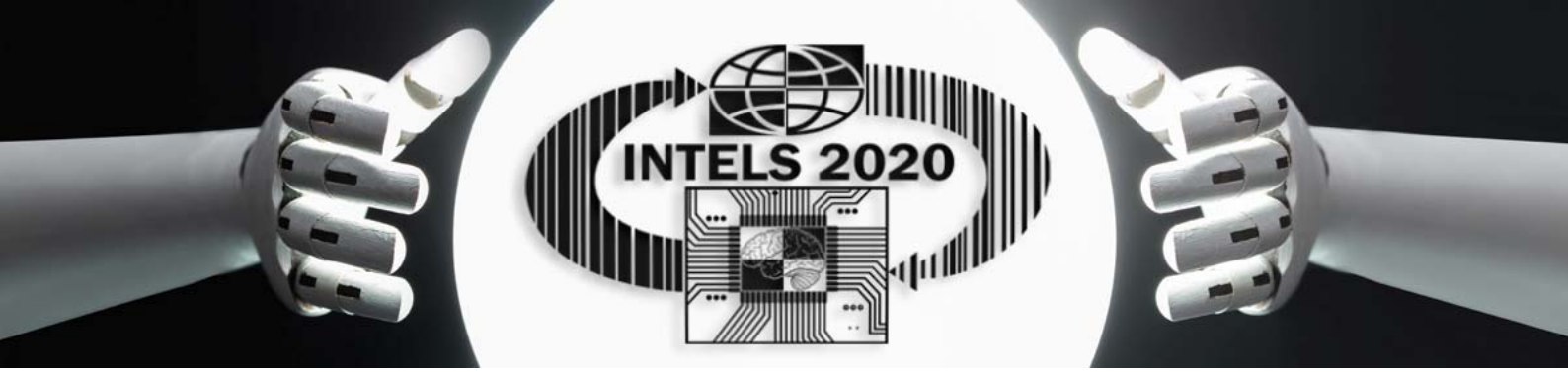

KEYNOTE 2

Multi-modal, Noisy and Large-Scale Engineering Optimization with Differential Evolution – Some Recent Approaches and Future Challenges

Dr. Swagatam Das
India Statistical Institute, Kolkata, India

14 December 2020 (Monday)
Starts at 14:00

Differential Evolution (DE) is arguably one of the most powerful stochastic optimization algorithms of current interest. Since its inception in 1995, DE has drawn the attention of many researchers all over the world resulting in a lot of variants of the basic algorithm with improved performance, especially on continuous parametric spaces.

This talk will begin with a brief but comprehensive overview of the basic concepts related to DE, its algorithmic components and control parameters. It will subsequently discuss some of the significant algorithmic variants of DE for bound-constrained single-objective optimization for high-dimensional search spaces. The talk will then focus on some interesting DE variants with additional mechanisms like a distance-based selection, a clustering procedure and bi-objective formulations for solving multi-peak optimization problems where the objective is to locate all the global and local optima of a fitness landscape during one run of the algorithm. The talk will finally highlight a few open research problems in the related areas.

BIO: Dr. Swagatam Das

Swagatam Das is currently serving as an associate professor at the Electronics and Communication Sciences Unit of the Indian Statistical Institute, Kolkata, India. His research interests include machine learning and non-convex optimization. Dr. Das has published one research monograph, one edited volume, and more than 300 research articles in peer-reviewed journals and international conferences. He is the founding co-editor-in-chief of Swarm and Evolutionary Computation, an international journal from Elsevier. He has also served as or is serving as the associate editors of Pattern Recognition, IEEE Computational Intelligence Magazine, IEEE Access, Neurocomputing, Engineering Applications of Artificial Intelligence, and Information Sciences. He is an editorial board member of Applied Soft Computing and Progress in Artificial Intelligence. He is also the founding Section Editor of Springer Nature Computer Science journal since 2020. Dr. Das has 19000+ Google Scholar citations and an H-index of 63 till date.

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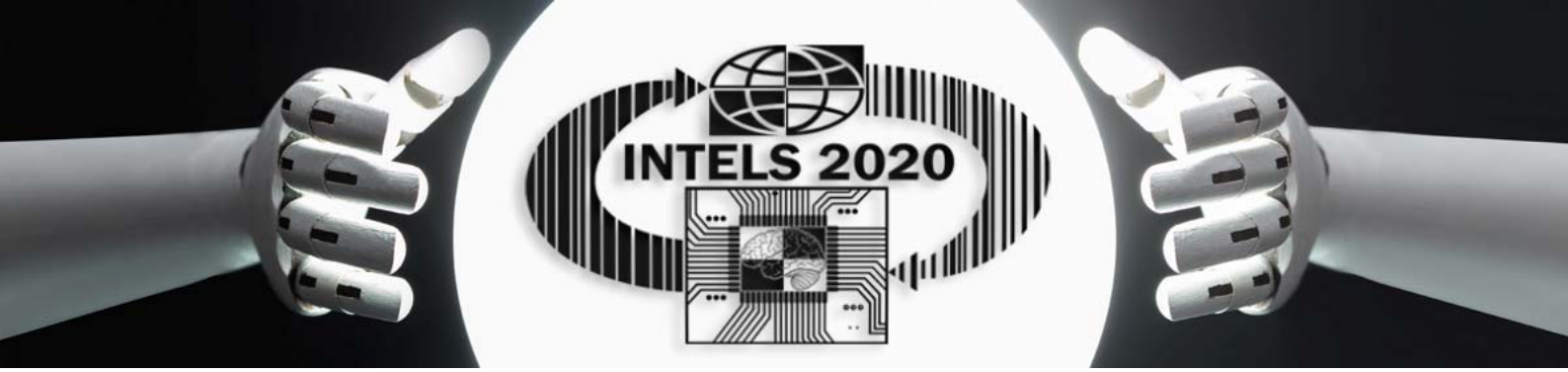


KEYNOTE 3

Control Training

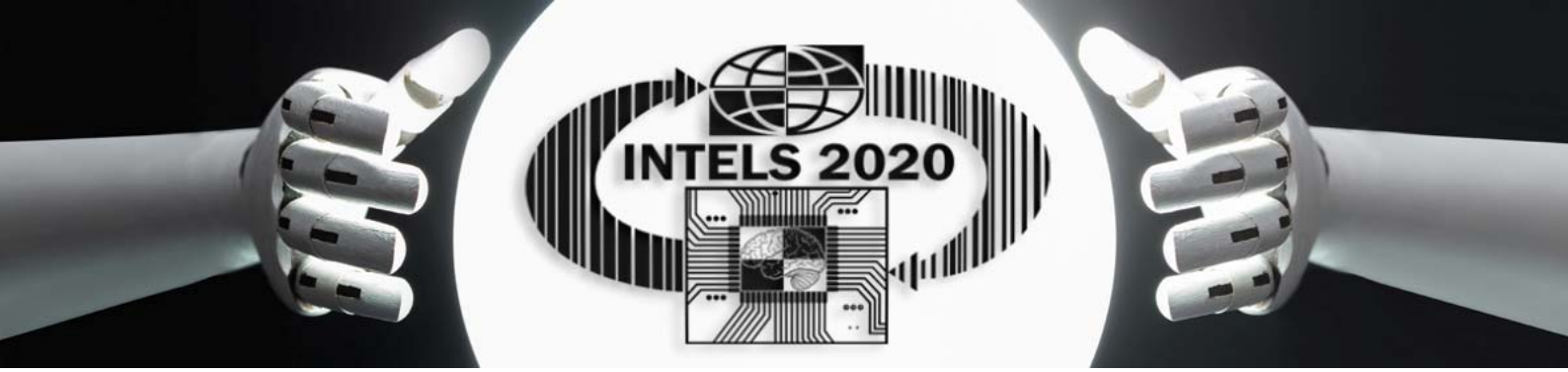
Prof. Askhat Diveev
Federal Research Center "Computer Science and Control" of Russian Academy of Sciences, Russia, RUDN University, Russia

15 December 2020 (Tuesday)
Starts at 12:05

A new paradigm of the synthesis of control systems is considered – a control training. According to the new approach, the creation of a control system consists in constructing some flexible control system, for example, in the form of a control function, and then, when solving optimal control problems, these functions are refined according to the optimization criterion. It is proposed to use symbolic regression methods as flexible constructions for the control function. It is shown that the control training procedure corresponds to the neural network training process without a teacher. Examples of control training for a group of robots are given.

BIO: Prof. Askhat Diveev

Askhat Diveev (born in 1954 in Magadan, USSR), Doctor of Technical Sciences, Professor. He graduated from the Bauman Moscow State Technical University (BMSTU) in 1980, in 1989 defended a Candidate thesis in BMSTU, in 2001 he became a Doctor of Technical Sciences in Dorodnitsyn Computing Center of the Russian Academy of Sciences, in 2009 he became a Professor. Main scientific results are following: a new method of symbolic regression for numerical solution of the control synthesis problem called the network operator method (2006), a method of small variations of the code of the basic solution for the optimal solution search in non-numerical space (2006), a theory of controllable networks for traffic flow control models based on network configuration change (2008), new methods of symbolic regression based on modifications of known methods of symbolic regression: variational genetic programming (2014), variational analytical programming (2015), binary variational genetic programming (2016), complete binary variational genetic programming (2017).



KEYNOTE 4

Observer Design in Finite Frequency domain: Application to Fault Diagnosis

Prof. Mohammed Chadli
University Paris-Saclay, IBISC Lab-UEVE, France

15 December 2020 (Tuesday)
Starts at 13:45

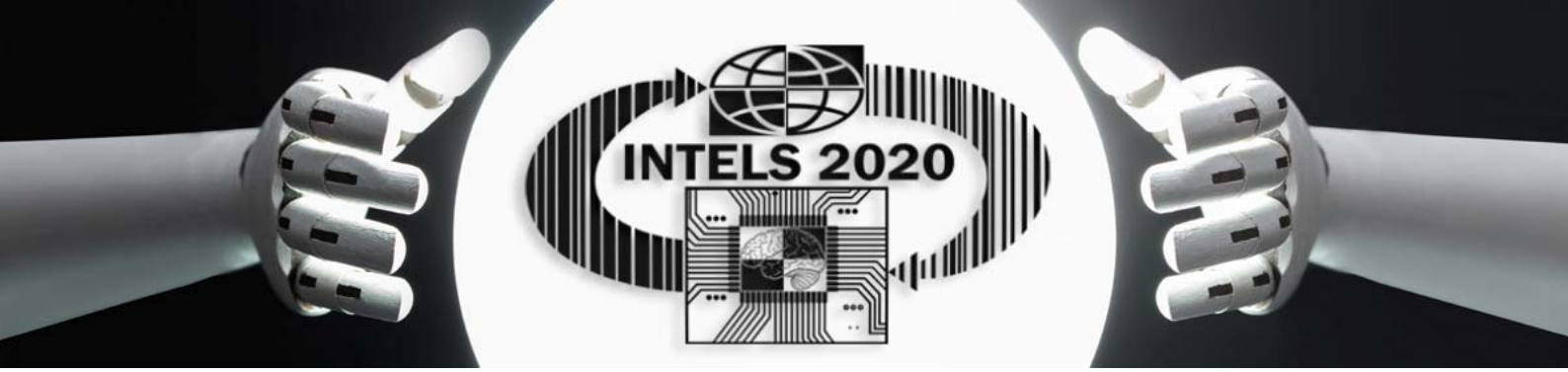
The talk will focus on the observers design in finite frequency domain. A filter is proposed in the finite-frequency domain to reduce the conservatism generated by those designed in the entire-frequency domain. In order to guarantee the best robustness to disturbances and sensitivity to faults, the developed filter combines the H_-/H_∞ performances. The multi-objective design is given in linear matrix inequality (LMI) terms. Illustrative example to validate the proposed the design technique is provided.

BIO: Prof. Mohammed Chadli

Mohammed Chadli (Senior Member'99, IEEE) received the MScEng (DEA) from the Engineering School INSA-Lyon (1999), the PhD thesis from the University of Lorraine (UL-CRAN) Nancy France in 2002 and his habilitation in 2011 at the University of Picardie Jules Verne (UPJV) Amiens, France. Since 2004, he was Associate Professor at the UPJV and currently Full Professor at the University Paris-Saclay, Univ Evry, IBISC Lab., France. He was a visiting professorship at the TUO-Ostrava (Czech Rep.), UiA (Norway), SMU-Shanghai (2014-2017) and NUAA-Nanjing (2018, 2019). Currently is a full professor at University Paris-Saclay, France.

Dr Chadli's research interests include fuzzy/LPV and switched systems, singular systems, robust control, fault detection and isolation (FDI), fault tolerant control (FTC) via LMI, SOS and Lyapunov methods. On the application side he is mainly interested in automotive control and renewable energy. He is co-author of books and book chapters (Wiley, Springer, Hermes), and numerous articles published in international journals and conferences.

Dr. Chadli is a senior member of IEEE. He is also an Editor/Associate Editor/Editorial Board Member of several international journals, including the IEEE Transactions on Fuzzy Systems, the IEEE Transactions on Industrial Electronics, the IET Control Theory and Applications, the Franklin Institute Journal, Asian Journal of Control, Cogent Engineering,... and was a Guest Editor for Special Issues in international journals.



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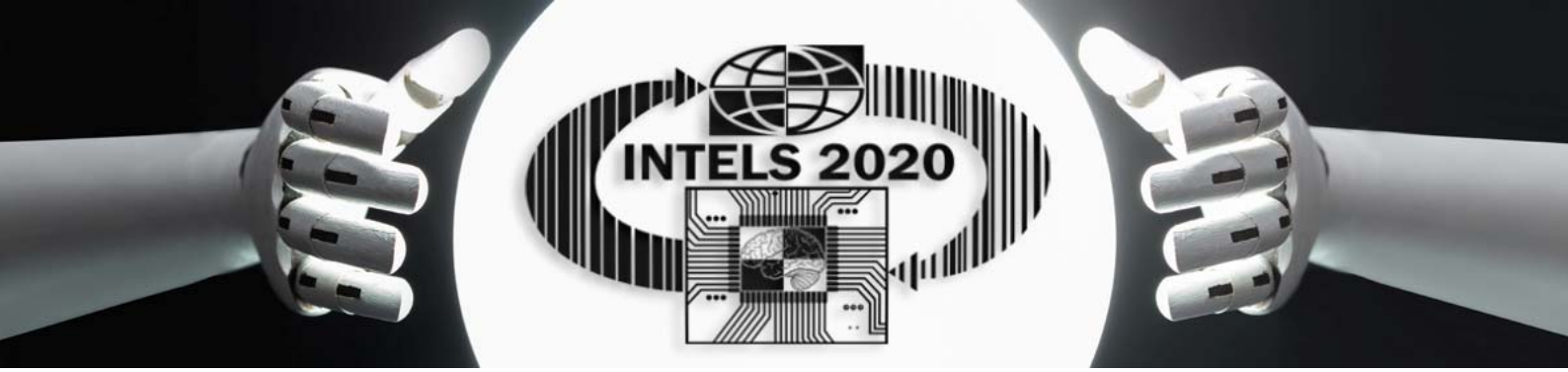
TECHNICAL SESSIONS

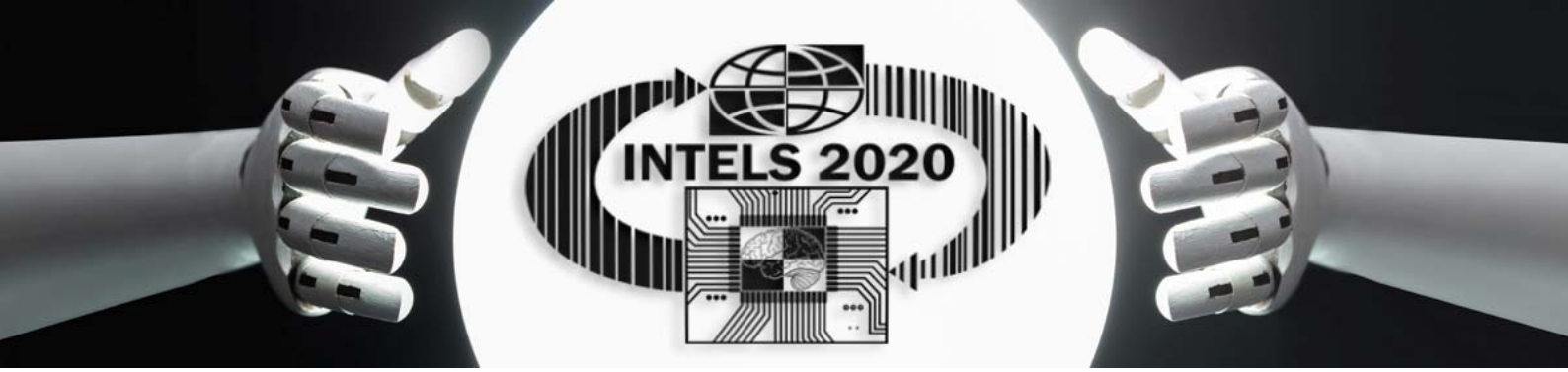
Technical Session 1 **Numerical Methods for Intelligent Control Systems**	
14 December, Monday Starts at 15:20	The session presents reports on the results of research and development of new methods, as well as on the effective application of well-known numerical methods for solving problems arising in the process of creating intelligent control systems
Technical Session 2 **Robotic Systems**	
14 December, Monday Starts at 15:20	This session is focused on the latest achievements in design and control of robotic systems, embedded software for manipulators, drones, mobile robots, and multi-robot systems, intelligent technologies for autonomous tracking, monitoring, and collision avoidance.
Technical Session 3 **Elements of Intelligent Control Systems**	
Part 1 14 December, Monday Starts at 15:20 Part 2 15 December, Tuesday Starts at 14:20	The session presents reports on the research of elements and subsystems of intelligent control systems, as well as the solution of particular problems arising in the process of developing intelligent systems. The elements of intelligent control systems are image, sounds, texts, signals recognition systems, forecasting systems, systems of decision making under uncertainty, access control systems and others. Also the creation of elements of automatic translation systems, automatic assistance, automatic medical systems, etc. are discussed.



Technical Session 4 AI-based Control	
15 December, Tuesday Starts at 14:20	The session presents reports on the development and application of intelligent control systems. A distinctive feature of intelligent control systems is the use of conditional operators and logical functions in control. Control systems for complex objects or objects operating in difficult conditions always have the signs of intelligent control systems. Intelligent control systems include smart systems and systems that replace the human operator in the control loop.

Technical Session 5 Fundamental Research in Intelligent Systems	
15 December, Tuesday Starts at 14:20	The session presents reports on theoretical mathematical research in the field of intelligent systems, mathematical formulations of problems, proofs of theorems, lemmas, statements defining the properties of intelligent systems and methods for solving problems arising in the process of their development.

Technical Session 6 Application of Artificial Neural Networks for Intelligent Control	
15 December, Tuesday Starts at 14:20	The session presents application of leading computational methods including neural networks, machine learning, fuzzy sets, multivalued logic, big data analysis algorithms, distributed computing, etc. for the development of intelligent control systems or its components.



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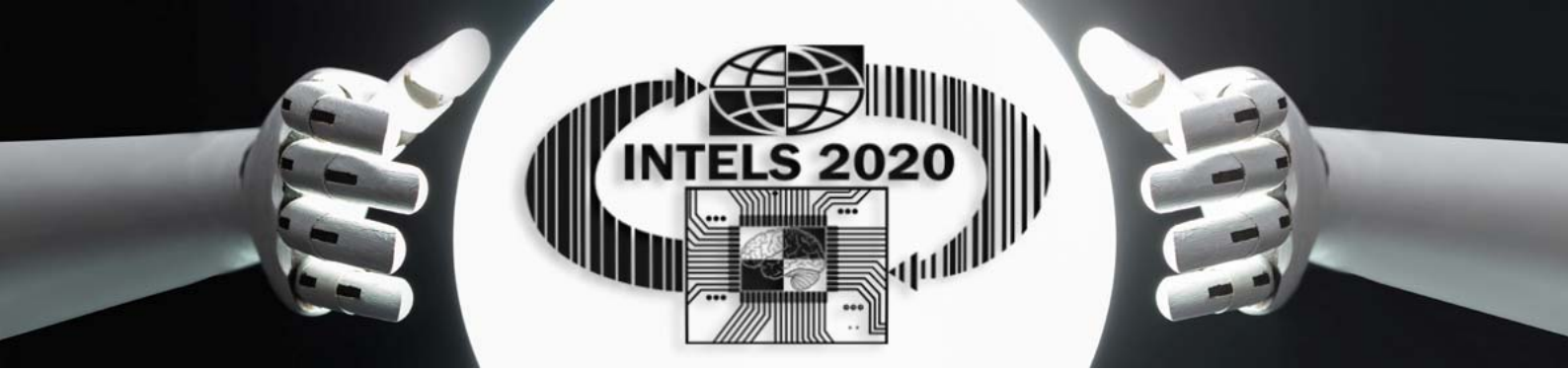
TECHNICAL PROGRAM

DAY 1 - 14 December 2020 (Monday)

Technical Session 1
Numerical Methods for Intelligent Control Systems

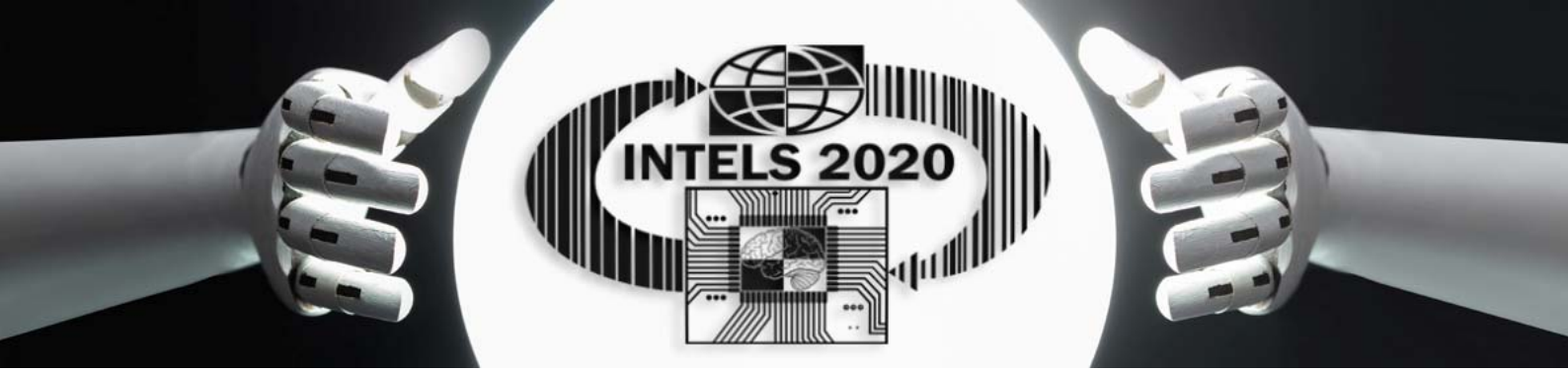
Conveners:
Askhat Diveev (FRC CSC of RAS, Russia)
Sergey Konstantinov (RUDN University, Russia)

15:20	Real-time system architecture design practices Andrey Getmanskiy, Semen Sechenev, Igor Ryadchikov, Alexander Gusev, Nikita Mikhalkov, Dmitry Kazakov, Alexey Simulin, Dmitry Sokolov
15:35	Combined Evolutionary Method of Feasible Directions in Multicriteria Synthesis Problem of a Dynamical System Program Control V.A. Serov
15:50	The main aspects of creating a system of data mining on the status of patients with Parkinson's disease Yulia Shichkina, Yulia Irishina, Elizaveta Stanevich, Armando de Jesus Plasencia Salgueiro
16:05	Variational analytic programming for synthesis of optimal control N.B. Konyrbaev, A.O. Dauitbayeva, A.B. Ostayeva, A.U. Yessirkepova, A.B. Bexeitova
16:20	Comparative study of numerical solutions for the optimal control problem in the presence of uncertainties Askhat Diveev, Elizaveta Shmalko
16:35	Structural and parametric synthesis of population algorithms for global optimization A.P. Karpenko, I.A. Kuzmina
16:50	Comparison of Hybrid ACO-k-means algorithm and Grub cut for MRI images segmentation S.A. El-Khatib, Y.A. Skobtsov, S.I. Rodzin
17:05	Application of chaotic Fish School Search optimization algorithm with exponential step decay in neural network loss function optimization L.A. Demidova, A.V. Gorchakov

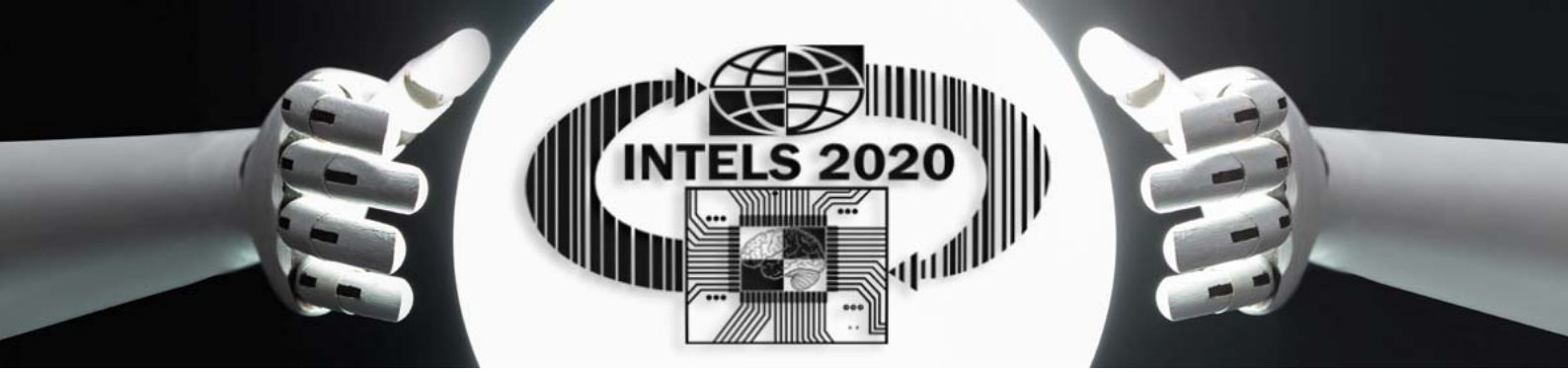


17:20	An approach to identify the hidden patterns in the datasets for patients with the multiple chronic diseases L.A. Demidova, N.V. Doroshina
17:35	Data mining techniques for electricity customer characterization Sérgio Ramos, João Soares, Samuel S. Cembranel, Inês Tavares, Z. Foroozandeh, Zita Vale, Rubipiara Fernandes
17:50	A new two-step approach for solving a control system synthesis problem by symbolic regression methods S.V. Konstantinov, A.I. Diveev
18:05	Solution of the optimal control problem by symbolic regression method A.I. Diveev, S.V. Konstantinov, A.M. Danilova
18:20	Formulation and Research of New Fitness Function in the Genetic Algorithm for Maximum Code Coverage T.V. Avdeenko, K.E. Serdyukov, Z.B. Tsydenov
18:35	Bit streaming processing algorithms for intelligent hardware converters O.I. Bureneva, M.S. Kupriyanov, N.M. Safyannikov
18:50	Deployment of parallel computing in a hybrid high-performance cluster based on virtualization technologies K.I. Volovich, S.A. Denisov, S.I. Malkovsky
	END of Technical Session 1

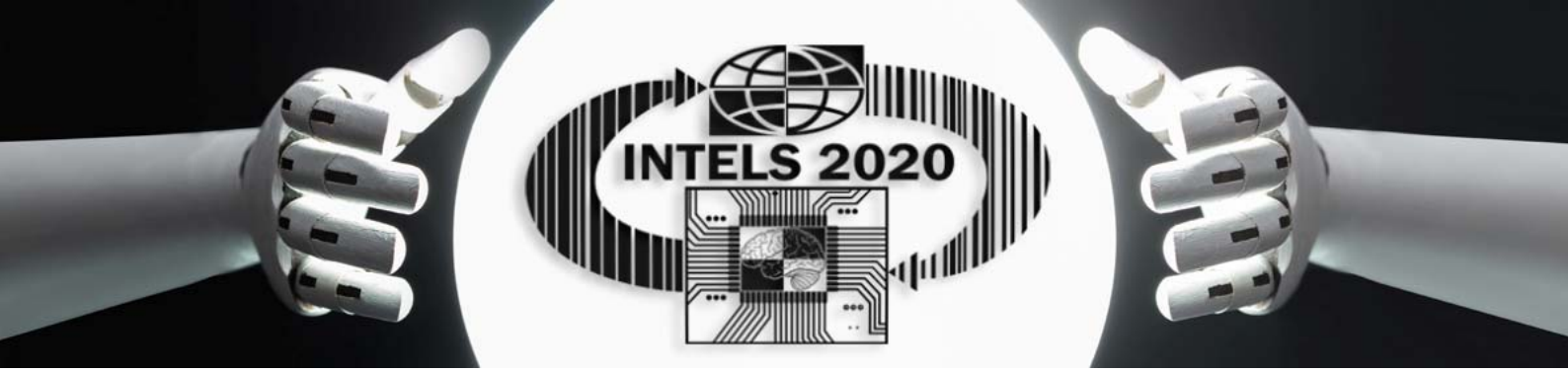
	Technical Session 2 **Robotic Systems**
	Conveners: *Dmitry Karamzin (FRC CSC of RAS, Russia)* *Anna Daryina (FRC CSC of RAS, Russia)*
15:20	Study on Control Methods Based on Identification of Unmanned Vehicle Model I.V. Prokopyev, E.A. Sofronova
15:35	A Regularization Approach to Analyze the Time-Optimal Motion of a Mobile Robot under State Constraints using Pontryagin's Maximum Principle Fernando Lobo Pereira, Roman Chertovskih, Anna Daryina, Askhat Diveev, Dmitry Karamzin, Elena Sofronova



15:50	**Autonomous Wheels And Camera Calibration In Duckietown Project** Kirill Krinkin, Konstantin Chayka, Anton Filatov, Artyom Filatov
16:05	**Multicriterial analyses of Pareto-efficiency for collaborative multiagent systems using genetic algorithm with variations** Vladimir Serebrenny, Elizaveta Shmalko
16:20	**Unmanned vehicle's control method based on neural network and selection function** Anna N. Daryina, Igor V. Prokopiev
16:35	**Reliable bounding of the implicitly defined sets with applications to robotics** Artem D. Maminov, Mikhail A. Posypkin, Sergey P. Shary
16:50	**Transfer Learning with Demonstration Forgetting for Robotic Manipulator** Ermek Aitygulov, Aleksandr I. Panov
17:05	**Numerical simulation of the workspace of robots with moving bases in the multi-agent system** Laxmidhar Behera, Larisa Rybak, Dmitry Malyshev, Sergey Khalapyan
17:20	**Real-Time Lidar-based Localization of Mobile Ground Robot** Ilya Belkin, Alexander Abramenko, Dmitry Yudin
17:35	**Decentralized model predictive control for autonomous robot swarms with restricted communication skills in unknown environments** Alexander Puzicha, Peter Buchholz
17:50	**Quadcopter active phased antenna array** D.A. Milyakov, V.S. Verba, V.I. Merkulov, A.S. Plyashechnik
18:05	**Collision-Aware Formation Assignment of Quadrotors** I.P. Titkov, A.A Karpunin
18:20	**Scissored pair control moment gyroscope inverted pendulum** Stanislav Aranovskiy, Igor Ryadchikov, Nikita Mikhalkov, Dmitry Kazakov, Alexey Simulin, Dmitry Sokolov
18:35	**Parametric optimization of unmanned vehicle controller by PSO algorithm** Anna N. Daryina, Igor V. Prokopiev
END of Technical Session 2	



	Technical Session 3 (part 1) **Elements of Intelligent Control Systems**
	Conveners: *Oleg Korsun (GosNIIAS, Russia)* *Evgeny Atamas (MSU, Russia)*
15:20	Methodology for determining the value of resistance to movement of a vehicle as a tool for research and optimization of the shape of the elements of a wheeled vehicle immersed in snow D.S. Teslenko, V.V. Belyakov, V.S. Makarov, S.S. Dralkin, D.A. Martynov, K.I Zaitsev, K.P. Zakharkina
15:35	Camera Pose Estimation Based on Structure from Motion M.N. Alkhatib, A.V. Bobkov, N.M. Zadoroznaya
15:50	DBScan and WrapDBScan methods applying for intellectual variance analysis in employee's moving P.A. Savenkov, A.N. Ivutin
16:05	Data processing model for mobile IoT systems T.T. Aung, A.M. Thaw, N.A. Zhukova, T. Man, V.V Chernokulsky
16:20	Cognitive approach to analysis of regular packing of congruent objects on plane N.N. Klevanskiy, S.I. Tkachev, L.A. Voloshchouk, V.S.Mavzovin
16:35	Development of a prototype of a medical information system for a clinical diagnostic center D.A. Andrikov, A.S. Kuchin
16:50	Homomorphic Encryption within Lattice-Based Encryption System Victor Kadykov, Alla Levina, Alexander Voznesensky
17:05	Adaptive MPI collective operations based on evaluations in LogP model A.A. Paznikov, M.S. Kupriyanov
17:20	The construction of local convex hull on the task of pattern recognition Kamilov Mirzoyan, Hudayberdiev Mirzaakbar, Khamroev Alisher
17:35	Cluster Keyboard Handwriting Z.V. Ilyichenkova, S.M. Ivanova
17:50	Computing infrastructure for scientific research in a digital transformation A.A. Zatsarinnyy
18:05	Method of centralized reproduction of information transmission processes in the digital platform control loop A.A. Zatsarinnyy, A.P. Shabanov
	END of Technical Session 3 (part 1) **END of the DAY 1**

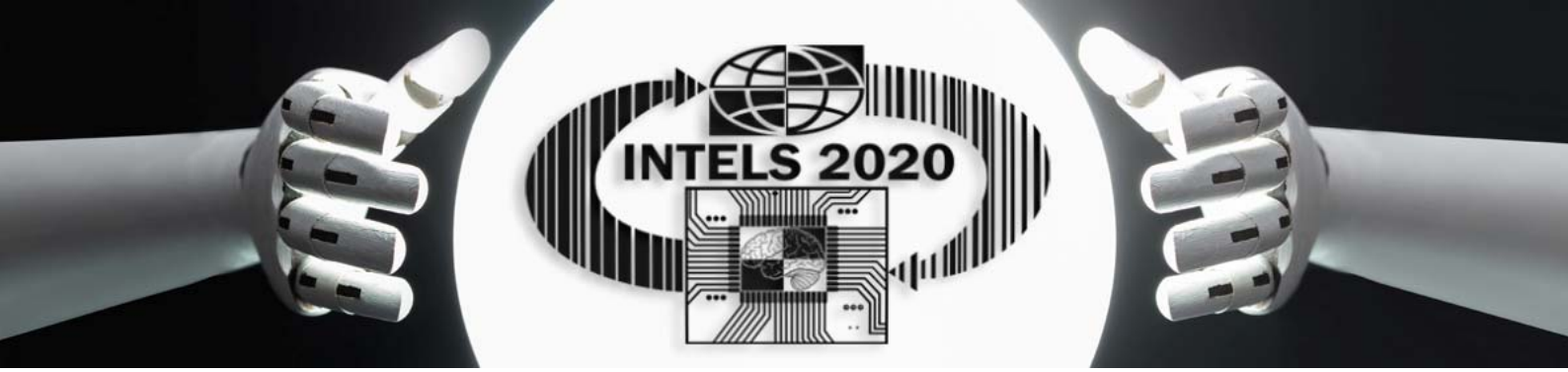


DAY 2 - 15 December 2020 (Tuesday)

Technical Session 3 (part 2)
Elements of Intelligent Control Systems

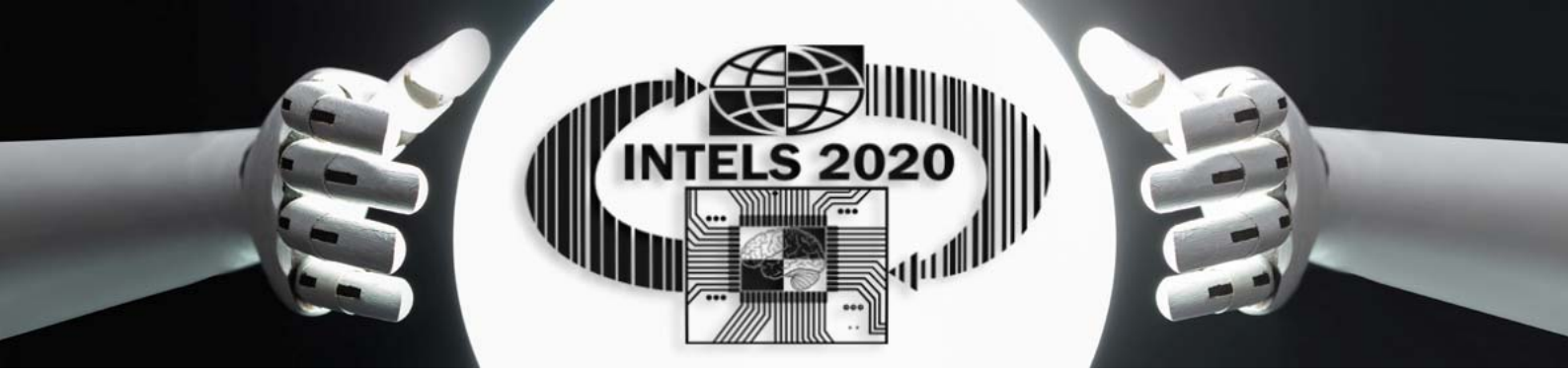
Conveners:
Liliya Demidova (MIREA, Russia)
Elizaveta Shmalko (FRC CSC of RAS, Russia)

14:20	Disrupting the Connectivity of Multiagent Peering Networks: a Model Study Yuri Monakhov, Anna Kuznetsova, Maria Gerasimova, Ilya Kulikov
14:35	A proposal for modeling cognitive ontogeny based on the brain-inspired generic framework for social-emotional intelligent actors Alexei V. Samsonovich, Alexander A. Eidlin
14:50	Modeling the dynamics of particles of gas-dust clouds in the photogravitational field of binary stellar systems A.T. Tureshbaev, U.Sh. Omarova
15:05	A decision support system for DM algorithm selection based on module extraction T. Man, N.A. Zhukova, A.M. Thaw, S.A. Abbas
15:20	Pre-launch AI matcher for distributed intelligent photo surveying Anton Ivaschenko, Arkadiy Krivosheev, Pavel Sitnikov
15:35	Parkinson's disease classification and medication adherence monitoring using smartphone-based gait assessment and deep reinforcement learning algorithm Armando de Jesús Plasencia Salgueiro, Yulia Shichkina, Arlety García García, Lynnette González Rodríguez
15:50	Continuous Wavelet Transform Applications In Steganography Vladmir Varuikhin, Alla Levina
16:05	Creation of adequate simulation models to analyze performance parameters of a virtual fog computing infrastructure Margarita Ushakova, Yury Ushakov, Irina Bolodurina, Alexander Shukhman, Leonid Legashev, Denis Parfenov
16:20	Secure-Reliable Smart Contract Applications Based Blockchain Technology in Smart Cities Environment Alexander A. Varfolomeev, Liwa H. Alfarhani, Zahraa Ch. Oleiwi
16:35	Coordination strategies in distribution network considering multiple aggregators and high penetration of electric vehicles José Almeida, João Soares, Bruno Canizes, Zita Vale
16:50	Intelligent Processing of Open-Ended Questions in Mass Web-Surveys Evgeny Nikulchev, Anastasiya Silaeva, Dmitry Ilin, Sergey Malykh



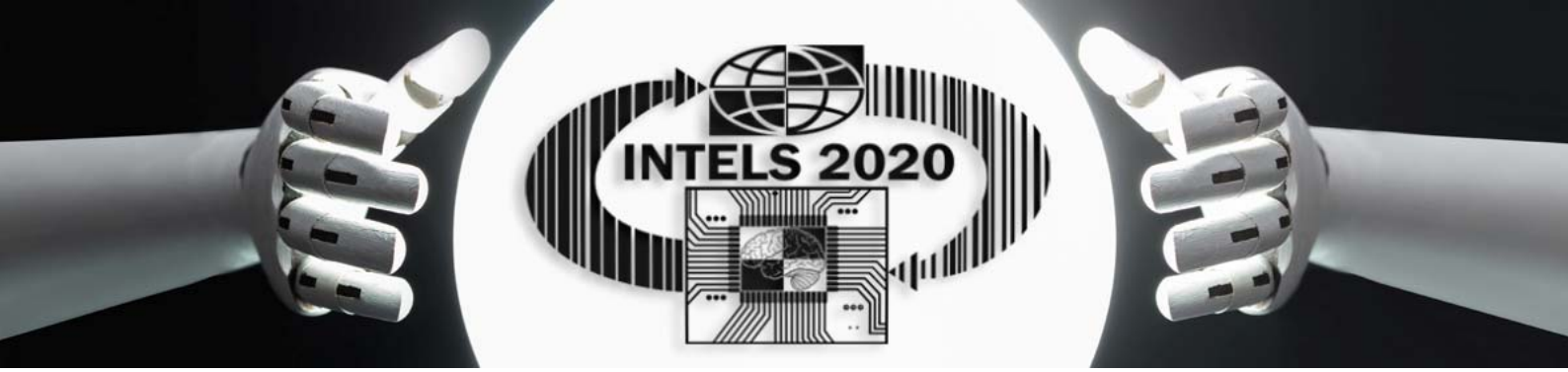
17:05	Development of a gaming application for a customized eight-processor device with a tangible interface Ilya V. Osipov, Simon Orlov, Ilya Egorushkin, Evgeny Nikulchev
17:20	Minimax Control Problems: Optimality Conditions P.G.P. Aquino, M.d.R. de Pinho, G.N. Silva
17:35	Research on the possibility to apply vibration blurring of a round mark image in technical condition monitoring of moving mechanisms A.V. Grigoriev, I.I. Kochegarov, N.K. Yurkov, N.V. Goryachev, N.S. Reuta
	END of Technical Session 3 (part 2)

	Technical Session 4 **AI-based Control**
	Conveners: *Askhat Diveev (FRC CSC of RAS, Russia)* *Elena Sofronova (FRC CSC of RAS, Russia)*
14:20	The modeling of forecasting new situations in the dynamics of the economic system on the example of several financial indicators N. Gabdrakhmanova, V. Fedin, B. Matsuta, M. Pilgun
14:35	Verification of the RRA-Algorithm Regularization for the Analysis of Stochastic Structures in Bioinformatic Intelligent Systems V. Kulikov, A. Kulikov, V. Khranilov
14:50	Symbolic Padé representation of stabilizing regulators for a class of nonlinear control systems with a parameter Yulia Danik, Mikhail Dmitriev
15:05	Problematic aspects of integrating a complete group of processes in the lifecycle of robotic control systems S.V. Kozlov
15:20	Comparison of action recognition from video and IMUs A.V. Podoprosvetov, A.P. Alisejchik, I.A. Orlov
15:35	The development of a stationary system for controlling the level of arterial blood oxygen saturation D.A. Andrikov, O.V. Danilova

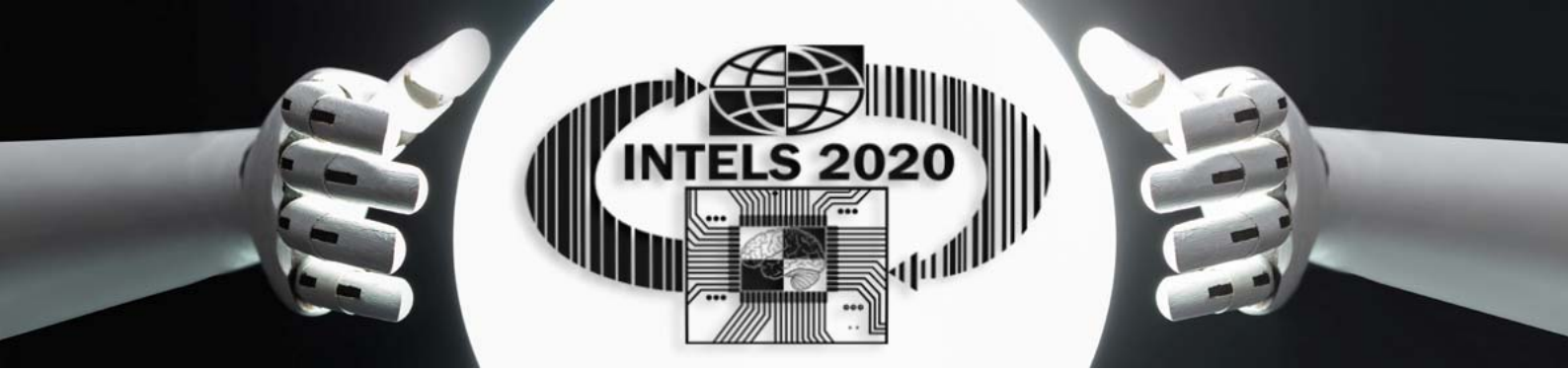


15:50	Optimization of the vehicle braking distance using hedge algebra controller Nguyen Quang Vinh, Le Tran Thang, Vuong Anh Trung
16:05	Framing Artificial Intelligence (AI) Additive Manufacturing (AM) Bernhard Heiden, Volodymyr Alieksieiev, Matthias Volk, Bianca Tonino-Heiden
16:20	Universal Recurrent Traffic Flows Model with Artificial Neural Networks for Approximation of Unknown Urban Road Subnetworks E.A. Sofronova, A.I. Diveev
16:35	Development of a vision system for safe and high-precision soft landing on the Moon Xu Yanga, A.V. Bobkov
16:50	Decision support systems configuration based on knowledge-driven automated service composition: requirements and conceptual model Andrew Ponomarev, Nikolay Mustafin
17:05	Algorithms for managing service-oriented research processes as services in hybrid computing environments of digital platforms V.A. Kondrashev, A.A. Sorokin
17:20	Model of a management system for deterministic scientific services of digital platform S.A. Denisov, A.A. Sorokin
	END of Technical Session 4

	Technical Session 5 **Fundamental Research in Intelligent Systems**
	Conveners: *Aleksander Ilin (MSU, Russia)* *Evgeny Atamas (MSU, Russia)*
14:20	Group control under conflict based on local threats and counter-threats method and swarm-leader model E.M. Voronov, V.A. Serov, D.A. Kozlov
14:35	A neuro-evolutionary synthesis of coordinated stable-effective compromises in hierarchical systems under conflict and uncertainty V.A. Serov, E.M. Voronov, D.A. Kozlov



14:50	Correction of an admissible control in a nonlinear perturbed problem with fixed ends Yu.S. Belinskaya, M.G. Dmitriev, D.A. Makarov
15:05	The artificial intelligence influence on real sociality G. Malinetsky, V. Smolin
15:20	Monotonicity of equilibriums in Cournot competition with mixed interactions of agents and epistemic models of uncertain market D.N. Fedyanin
15:35	The principle of dividing feasible trajectories in a robot control problem V.A. Bereznev
15:50	Models for Supporting the Operating Scenarios during a Life Cycle in Automated Systems V.P. Khranilov, P.V. Misevich, E.N. Pankratova, A.E. Ermilov
16:05	Tokamak plasma models development for plasma magnetic control systems design by first principle equations and identification approach Y.V. Mitrishkin, N.M. Kartsev, A.A. Prokhorov, E.A. Pavlova, P.S. Korenev, A.E. Konkov, V.I. Kruzhkov, S.L. Ivanova
16:20	Dynamic and Information Properties of Intelligent Control Systems K.A. Pupkov, Y.K. Brovarskaya
16:35	Algorithmization of control of information and telecommunication systems based on the optimization model I.Ya. Lvovich, Ya.E. Lvovich, A.P. Preobrazhenskiy, O.N. Choporov
16:50	The method of inductive synthesis of hierarchical knowledge graphs of telecommunication networks based on statistical data K.V. Krinkin, A.I. Vodyaho, I.A. Kulikov, N.A. Zhukova
17:05	The constructing of cognitive functions ontology M.Sh. Murtazina, T.V. Avdeenko
17:20	Adaptive robust control of a multi-degree-of-freedom mechanical plant with resilient properties Le Hong Quang, V.V. Putov, V.N. Sheludko
17:35	Approaches to aircraft flight tests at high angles of attack O.A. Balyk, O.N. Korsun, M.V. Zolotaeva
17:50	Usage of natural balance mode in automatic trajectory control of aircraft with non-standard configurations I.V. Mironova, M.E. Savrushkina, N.A. Chulin
END of Technical Session 5	



Technical Session 6 **Application of Artificial Neural Networks for Intelligent Control**	
	Conveners: *Aleksander Panov (FRC CSC of RAS, Russia)* *Andrey Bokovoy (FRC CSC of RAS, Russia)*
14:20	Cognitive systems, artificial neural networks and differential equations: social media data N. Gabdrakhmanova, M. Pilgun
14:35	Backpropagation method modification using Taylor series to improve accuracy of offline neural network training Anton Glushchenko, Vladislav Petrov, Konstantin Lastochkin
14:50	Neural Network for Grain Yield Predicting Based Multispectral Satellite Imagery: Comparative Study Z.H. Khalil, S.M. Abdullaev
15:05	Convolutional neural networks emotion recognition and blink characteristics analysis for operator state estimation Oleg Korsun, Vladimir Yurko
15:20	Optimizing regular computations based on neural networks and Graph Traversal O.T. Mohammed, M.S. Heidari, A.A. Paznikov
15:35	Morphological model of self-similar multilayer neural networks A.Yu. Dorogov
15:50	Machine learning algorithm based on convex hull analysis A.P. Nemirko, J.H. Dulá
16:05	Tracking of atmospheric phenomena with artificial neural networks: a supervised approach Mikhail Krinitskiy, Kirill Grashchenkov, Natalia Tilinina, Sergey Gulev
16:20	Analysis of the impact of visual attacks on the characteristics of neural networks in image recognition N.A. Andriyanov, V.E. Dementiev, Yu.D. Kargashin
16:35	Automatic Animal Behavior Analysis: Opportunities for Combining Knowledge Representation with Machine Learning Anna Zamansky, Aleksandr Sinitca, Dirk van der Linden, Dmitry Kaplun
16:50	Adaptive management with forecasting and neural network implementation A.A. Kobzev, Y.E. Mishulin, A.V. Lekareva
17:05	Stratified model of self-similar multi-layer neural network A.Yu. Dorogov
17:20	Comparison of Poisson process and machine learning algorithms approach for credit card fraud detection Anastasiia Izotova, Adel Valiullin
17:35	Control of network representation efficiency in neurogenesis M.A. Mitrokhin, N.V. Sleptsov, I.I. Kochegarov, A.V. Lysenko, N.K. Yurkov
END of Technical Session 6 **END of the DAY 2**	