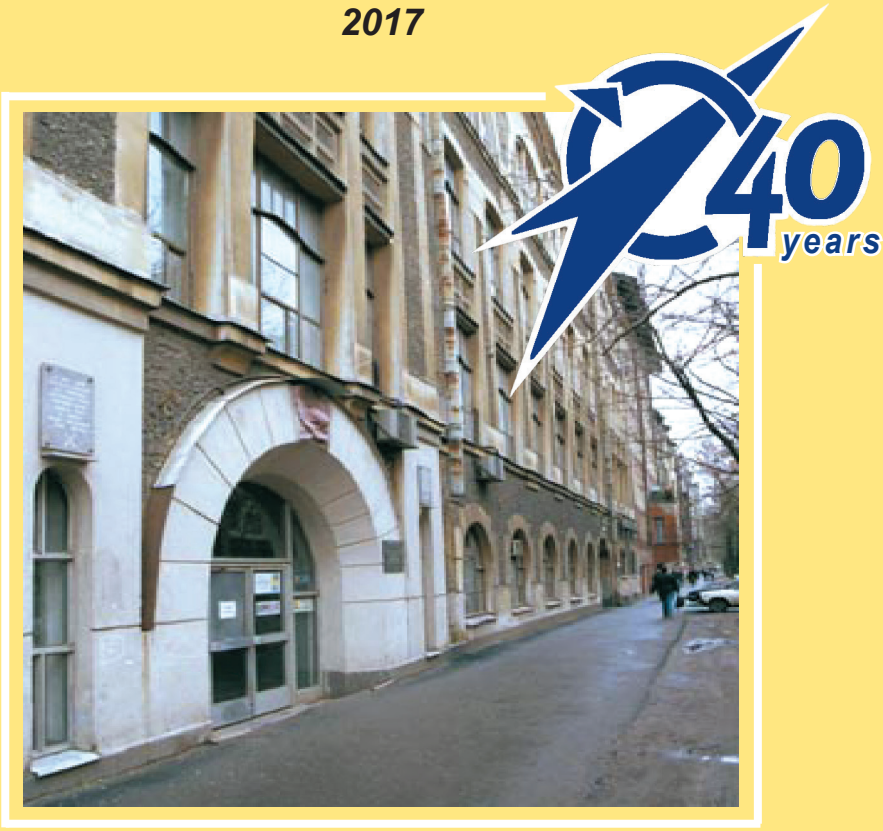
Russian Federation

Federal Agency for Scientific Organizations

ST. PETERSBURG INSTITUTE FOR INFORMATICS AND AUTOMATION OF THE RUSSIAN ACADEMY OF SCIENCES

Annual Report

2017



St.Petersburg, 2017

SPIIRAS

Russian Federation

Federal Agency for Scientific Organizations

ST. PETERSBURG INSTITUTE FOR INFORMATICS AND AUTOMATION OF THE RUSSIAN ACADEMY OF SCIENCES

Annual Report 2017

St. Petersburg, 2017

SPIIRAS Administration

Director
Yusupov, Rafael M.
Corresponding Member of RAS,
Honored Scientist of the Russian Federation
Tel: +7(812)328-3311; (812)328-3411; *Fax: +7(812)328-4450*
E-mail*:* **yusupov@iias.spb.su**
Deputy-Director for Research
Ronzhin, Andrey L.
Professor of RAS, Doctor of Technical Sciences
Tel: +7(812)328-7081, E-mail: **ronzhin@iias.spb.su**
Deputy-Director for Research
Sokolov, Boris V.
Professor, Doctor of Technical Sciences
Honored Scientist of the Russian Federation
Tel: +7(812)328-0103, E-mail: **sokol@iias.spb.su**
Deputy-Director for Maintenance
Tkach, Anatoly F.
Associate Professor, Candidate of Technical Sciences
Tel: +7(812)328-1433, E-mail: **spiiran@iias.spb.su**
Scientific Secretary
Silla, Evgeny P.
Candidate of Military Sciences
Tel: +7(812)328-0625; E-mail: **silla@ iias.spb.su**
Assistant to Director for International Research Cooperation
Podnozova, Irina P. MS in Electrical Engineering
Tel: +7(812)328-4446; Fax: +7(812)328-0685
E-mail: **ipp@mail.iias.spb.su**

Street Address: 39, 14 Line, St.Petersburg, 199178, Russia
Tel. (812)328-3311; Fax: +7(812)328-4450
E-mail: **spiiran@iias.spb.su**
Web: **http://www.spiiras.nw.ru**

General Information

The Federal State Institution of Science St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences was founded in 1978 according to the Decree of the Council of Ministers of the USSR dated 12/19/1977 and to the Decision of the Presidium of the USSR Academy of Sciences dated 01/19/1978 on the basis of the Computer Science Department of Ioffe Physical and Technical Institute of the USSR Academy of Sciences, and was assigned the name of Leningrad Research Computer Center (LRCC) of the USSR Academy of Sciences. Currently the Institute is the only one scientific institution in the North-West region of Russia that does basic research in information technologies and automation. Since February, 1991 and at present Professor Rafael M. Yusupov, Corresponding Member of RAS is the head of the Institute.

Based on LRCC one of the first global computer and information networks in the country the Academic Network “North-West” was created. In 1985 LRCC was transformed into Leningrad Institute for Informatics and Automation of the USSR Academy of Sciences.

By 1991 the Institute grew into a large scientific research organization, and its several departments gave rise to a new institution of the Academy of Sciences: Center of Ecologic Security of the St. Petersburg Scientific Research Center of RAS. In 1992 when historic name of St. Petersburg was returned to the city the Institute in turn was renamed in St. Petersburg Institute for Informatics and Automation of RAS (SPIIRAS). According to the Decree of the Russian Federation Government dated 12/30/2013 No. 2591-p the Institute was handed over to the RF Federal Agency for Scientific Organizations (FASO Russia).

The Russian Academy of Sciences provides for the scientific and methodological guidance in regard to the Institute research activities.

The Institute purpose and object of activities are to do basic, prediscovery and applied scientific research aimed at the acquisition of new knowledge in the area of informatics and automation, control methods and information and telecommunication technologies applicable to solving actual scientific and engineering as well as social and economic problems, including those of interdisciplinary nature.

In its basic, prediscovery and applied scientific research the Institute follows the below directions:

– fundamental basics of the informatics, informatization of the society and regions, origination and development of the national state and world intelligent information resourses, social networks;

- fundamental basics of the information security, cyber-security of the computer and telecommunication systems; counteractions against cyber-terrorism;
- theoretic basics of constructing the technologies of Big Data analysis and processing intended for solving problems of regularities' detection, machine learning, estimation models' building (construction), prognostication, and decision-making over a finite set of alternatives;
- fundamental basics of integration and self-organization in the existing and promising public as well as commercial information-management and telecommunication systems and networks at various stages of their life-cycles;
- fundamental and technologic basics of building and implementation of intelligent integrated systems for decision-making support and multimodal users' interfaces in man-machine and robot complexes;
- fundamental basics of complex modeling and automation at proactive monitoring and information processes control in complex (info-, bio-, eco-, cogni-, socio-, geo-, aerospace and transportation) systems.

Basic and applied research as well as design projects in the above listed areas are being done in accordance with the works of the Government Task approved by FASO Russia for the Institute in regard to the RAS Programs, within the projects of the Federal Special Programs and Programs of the Russian Federation Ministries and Services, under regional scientific programs, under grants of the Russian Federation State Scientific Foundations and other state foundations, international and foreign institutional foundations, order-driven works for domestic and international agencies and organizations in conjunction with domestic and foreign universities, research institutions and industrial companies.

Below given the most important applied results of the Institute's research, that match The List of Crucial Technologies for the Russian Federation, are included in the report to the RF President and to the RF Government on the state of basic and applied sciences in the Russian Federation and on the most important scientific advancements of the Russian scientiscts in 2017:

- methodology and intelligent technology aimed at developing and introducing ***the unified software platform*** (USP) as well as the appropriate distributed multifunctional ***decision-making support system*** (SDMS) at control of the military-state management ob-

jects at strategic, operational - tactical and operation levels, that permits the real-time processing of the extra large bodies of incoming measurement information that regards the forces' and means' state at presence of incorrect, inaccurate and contradictory data and development of timely and reasonable control actions. In the result of deployment at the command and staff exercises the above development had been approved by the RF MD General Staff. The result is obtained by the SPIIRAS laboratory of information technologies in system analysis and modeling; Professor Boris V. Sokolov Honored Scientists of the Russian Federation Doctor of Sciences is the principal investigator;

– a multi-modal system for audio-visual continuous Russian speech recognition (AVSpeechRecognition) using high-speed video data, this automated system simultaneously analyses audio from a microphone and video from a high-speed camera (using JAI Pulnix camera with 200 fps at the resolution of 640x480) and fuses information with Coupled Hidden Markov Models (CHMM). The experimental setup and collected multimodal database HAVRUS have allowed for exploring the impact brought by the high-speed video recordings with various frames per second (fps) starting from standard 25 fps up to high-speed 200 fps, as well as for increasing the word recognition accuracy by 3-10% and to improve robustness of speech recognition in conditions of dynamic acoustic noises with SNR below 10dB. The research was done under the state contract with the RF Ministry of Education and Science No.14.616.21.0056: "Study and development of audio-visual Russian speech recognition system with a microphone and a high-speed video camera" and supported by the RFBR grant No.15-07-04415: "Models and methods for audio-visual signals processing aimed at the Russian speech bimodal recognition", authors: chief researcher, Dr. Sci (Tech) A. A. Karpov, junior researcher D. V. Ivanko, Junior Reseacher D. A. Ryumin, senior researcher, PhD I. S. Kipyatkova

The Institute is obviously one of the leading Russian scientific research organizations in the field of society informatization. The Institute scholars developed the society informatiztion scientific and methodological basics. They also contributed a lot to developing the concept of informatization of the city of St. Petersburg and proposed the ways of its realization as weelk as the strategy of its transition to the information society, conceptual frameworks of the information policy accepted by the St. Petersburg Administration as guiding documents. Also were developed the model laws for the Commonwealth

of Independent States (the CIS) countries: “About Informatization, Information and Information Protection”, “About Electronic Commerce”, “About Crucially Important Objects in Information and Telecommunication Infrastructure”; “Strategy Ensuring Information Security for the CIS Countries”; “Model Regulations for Administrative Procedures Executed by Authorized Agencies in the Sphere of Information Security Assurance for the CIS Countries”. These documents are accepted as guidance by the CIS Interparliamentary Assembly. Besides “The Recommendations on Reapproachment and Harmonization of National Legislations in Assurance for Information and Communication Security of the Countries – CSTO Members” were developed. The problems of information assurance on the assumption of the society informatization were investigated.

The SPIIRAS research and experimental basis (REB) is constituted by researcher-oriented workstations integrated into a multi-level local computer network furnished with an Internet access through the nodes of RCOM and ROKSON providers. The above RDB’s most important constituents are the SPIIRAS Computer Research and Educational Center, Research and Educational Center “Technologies of Intellectual Space”, Innovation and Educational Center of Space Services, established under the agreement with RosCosmos, “Educational Center for Training the Certified Specialists in Processing Data of the Earth Remote Sensing” that includes the geoinformation complex of space monitoring. The RDB also incorporates High Performance Computer Cluster and Robot-Technical Complex.

The Institute organizes and hosts series of international scientific conferences like: “Regional Informatics”, “Information Assurance of Regions of Russia”, “Speech and Computer”, “Mathematical Methods, Models & Architectures for Computer Networks Security”, “Information Fusion and Geo-information Systems”, “Simulation: Theory and Practice”, “Interactive Collaborative Robotics”; conferences on the theory of multi-agent systems and their applications and other. SPIIRAS scholars actively participate in international and domestic conferences and exhibitions; serve on the boards of international and Russian scientific journals. Within 40 years the Institute researchers published over 110 monographs and 1100 papers with domestic (“Nauka”, “Mashinostroenie”, etc) and international (“Springer”, “Kluwer”, Elsevier, CRC Press, etc.) publishers. Staring from 2002 SPIIRAS prints its own transactions, and over 90 collected articles were published over the 40 years time span. Since 2011 the SPIIRAS proceedings are included in the list of the RF VAK journals, and since 2016 – in the Scopus international data base.

To-day the SPIIRAS staff comprises one corresponding member of RAS, 40 full professors and 60 scientists bearing Ph. D. degrees. SPIIRAS members are bestowed 32 governmental awards, and twelve are assigned a title of the Honored Scientist of the Russian Federation. Ten researchers are the RF Government Prizes winners, ten - are awarded the scholarships of the Presiden of the Russian Federation, eighteen – received the RF President Grants.

SPIIRAS obtained an accreditation of educational activity valid until May 18, 2022, and has a right to perform the educational activity in accordance with the license No. 2719 issued on April 04, 2012 by the Federal Service for Supervision in the Sphere of Education and Science in the following areas of post-graduate student training:

– 09.06.01 Informatics and Computer Science

a) direction “System analysis, control and information processing” (05.13.01);

b) direction “Mathematic- and software of computers, computer complexes, and computer networks” (05.13.11);

– 10.06.01 Information Security

a) direction “Methods and systems for information security, information assurance”(05.13.19).

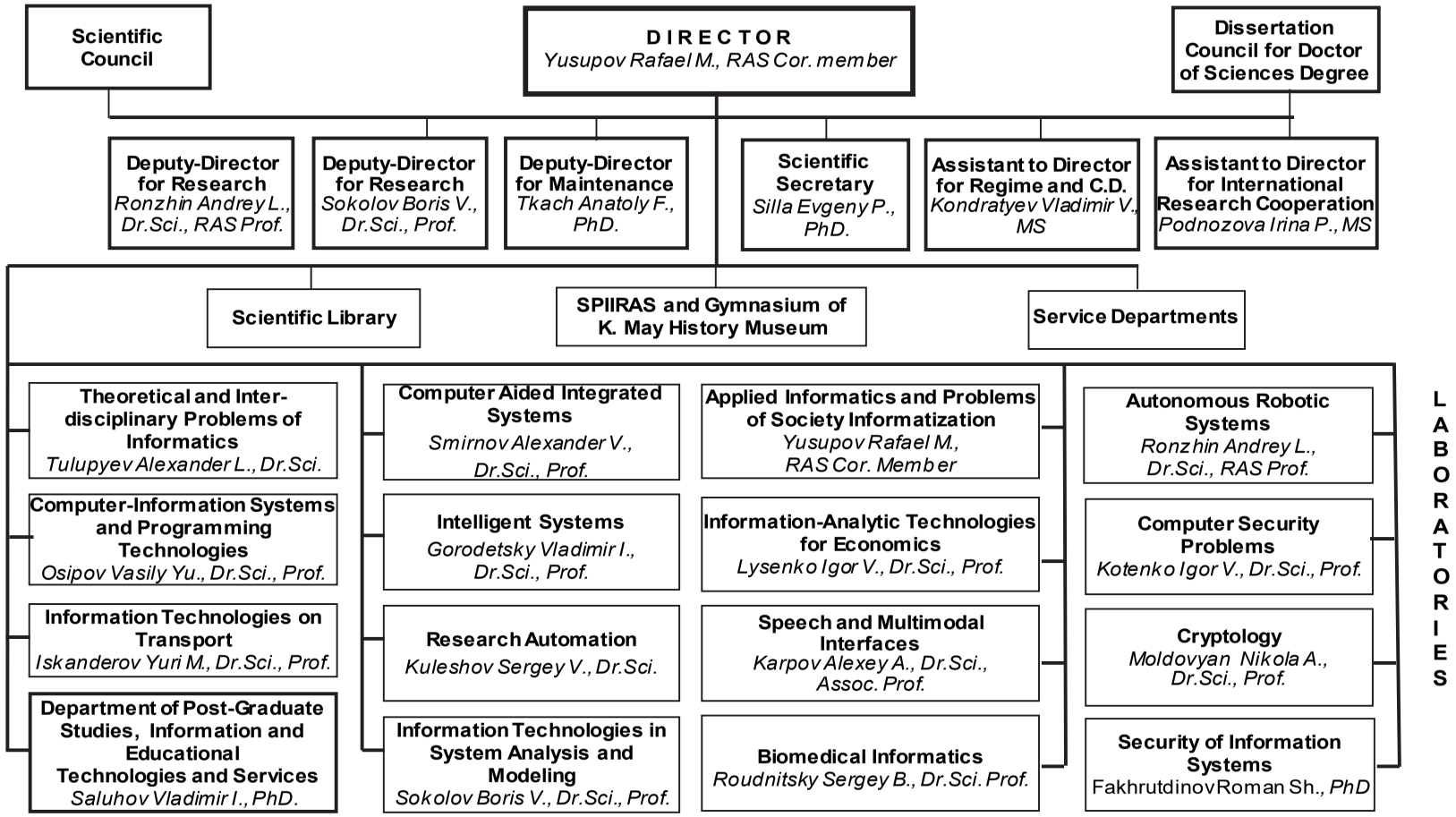
Currently, the SPIIRAS post-graduate course counts 30 post graduate students, also functions the institution of doctoral candidacy. Totally over 100 candidates of sciences and 45 doctors of sciences have been prepared.

The Doctoral Dissertation Council functions in the following specialities: 05.13.01 “System analysis, control, and information processing”; 05.13.11 “Mathematic- and soft- ware of computers, computer complexes, and computer networks”; 05.13.19 “Methods and systems for information security, information assurance”.

The Museum of SPIIRAS and Carl May School is established and maintained at the Institute that currently occupies the building that used to be the above mentioned school premises. 40 members of the Russian Academy of Sciences and the Academy of Fine Arts, 156 Full Professors, two ministers, seven governors, four members of the State Council, twenty generals and admirals, three Heroes of Socialist Labor, two pilot-cosmonauts G. M. Grechko and A. I. Borisenko are among the C. May School alumni.

Using the Museum’s factual database the Institute scientists run enlightenment and educational activities at the secondary and higher schools of St. Petersburg promoting, at that, the best scientific, pedagogic, cultural and ethical traditions of the Russian education and science.

SPIIRAS STRUCTURE 2017



SPIIRAS Economical Agencies

LTD «Strategic information technologies»

«R&D Center of Cryptography SPIIRAS» Ltd. (R&DCC SPIIRAS)

LTD «R&D Center for Innovative Space Technologies SPIIRAS» (R&DCIST SPIIRAS)

Conferences, Exhibitions

Conferences and Workshops Managed and Hosted by SPIIRAS in 2017:

- 25-th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP-2017). http://pdp2017.org. St. Petersburg (Russia), March 06-08, 2017 *(Kotenko I.V.)*
- International Conference “Ruscrypto”. Session “Prospective Research in Cyber Security”, Solnechnogorsk (Russia), March 21-24, 2017 *(Kotenko I.V.)*
- IV International Summer School on Artificial Itelligence for students, graduate students, young scientists and specialists “Intelligent Systems and Technologies: State-of-the-Art and Prospectives – 2017” (ISyT-2017). www.spiiras.nw.ru/ru/scientific-organizational- ctivity/conferences.html, St. Petersburg (Russia), Molodyozhnoe, June 30–July 4, 2017 *(Tulupyev A.L.)*
- VII All-Russia Theoretical and Practical Conference “Fuzzy Systems, Soft Computing and Intelligent Technologies – 2017” (FSSC-2017). www.spiiras.nw.ru/ru/scientific-organizational-activity/conferences.html. St/ Petersburg (Russia), July 03-12, 2017 *(Tulupyev A. L.)*
- 7th International Conference “Mathematical Models, Methods and Architectures for Computer Networks Security” (MMM-ACNS - 2017). http://www.mmm-acns2017.pl/, Warsaw (Poland), August 28-30, 2017 *(Kotenko I.V.)*
- 19-th International Conference “Speech and Computer“ SPECOM-2017. http://specom.nw.ru/. Hatfield (England, UK), September 12-16, 2017 *(Karpov A.A.)*
- 2-nd International Conference “Interactive Collaborative Robotics” ICR-2017. http://specom.nw.ru/icr2017.html. Hatfield (England, UK), September 12-16, 2017 *(Ronzhin A.L.)*
- X St. Petersburg Interregional Conference “Information Security of the Russian Regions (ISRR-2017)”. www.spiiras.nw.ru. St. Petersburg (Russia), October 25-27, 2017 *(Yusupov R.M.)*
- 8-th All-Russian Theoretical and Practical Conference “Simulation. The Theory and Practice” (IMMOD-2017). www.simulation.su. St. Petersburg (Russia), October 18-20, 2017 *(Sokolov B.V.)*
- III Interregional Theoretical and Practical Conference “Advanced Lines of Development in National Information Technologies”, www.spiiras.nw.ru. St. Petersburg (Russia), October 19-21, 2017 *(Kasatkin V.V.)*
- 3-rd International School for Young Scientists “Incident Management and Counteraction to Target Cyber and Physical Attacks in Distributed Large-Scale Crucially Important Systems (IM&CTCPA

2017)",", The Russian Science Foundation (RSF) Grant №15-11-300029 “Incident Management and Counteraction to Target Cyber and Physical Attacks in Distributed Large-Scale Crucially Important Systems with due Regard for Cloud Services and Networks of Internet Things”. http://www.comsec.spb.ru/ru/conferences. St. Petersburg (Russia), November 27-29, 2017 *(Kotenko I.V.)*

Furthermore, 37 SPIIRAS scientists and professionals participated in over 35 other international conferences, workshops and meetings as invited speakers, speakers and program committees’ members.

Conferences and Workshops to be Organized by SPIIRAS in 2018

- 26-th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP-2018), March 21-23, 2018. Cambridge (UK), Cambridge University. March 21-23, 2018. (*Kotenko I.V.*)
- XIII International Conference on Electromechanics and Robotic “Zavalishin’s Readings” (ER(ZR)-2018). St. Petersburg (Russia), April 18-21, 2018 (*Ronzhin A.L.*)
- St. Petersburg Youth Summer School: “Information Technologies in Logistics”. St. Peterrsburg (Russia), June 6- 8, 2018. (*Iskanderov Yu.M.*)
- 20-th International Conference “Speech and Computer“ SPECOM-2018. http://specom.nw.ru/. Leipzig (Germany), September 18-22, 2018 (*Karpov A.A.*)
- 3-rd International Conference “Interactive Collaborative Robotics” ICR-2018. http://specom.nw.ru/icr2018.html. Leipzig (Germany), September 18-22, 2018 (*Ronzhin A.L*.)
- IV Interregional Theoretical and Practical Conference: “Advanced Lines of Development in National Information Technologies”, Sevastopol (Crimea), September 18-22, 2018 (*Yusupov R.M.*)
- XVI St. Petersburg International Conference “Regional Informatics (RI-2018)”, St. Petersburg (Russia), October 24-26, 2018 (*Yusupov R.M.*)
- 4-th International School for Young Scientists “Incident Management and Counteraction to Target Cyber and Physical Attacks in Distributed Large-Scale Crucially Important Systems (IM&CTCPA 2018)",. http://www.comsec.spb.ru/ru/conferences. St. Petersburg (Russia), November 21-23, 2018 (*Kotenko I.V.*)

International Cooperation

In 2017 SPIIRAS continued interactions and international scientific cooperation through international contracts, agreements, grants, has further proceeded with the established R&D contacts, information exchange; a number of international scientific centers SPIIRAS keeps in touch with accepted the Institute scientists delegated to participate in

joint projects, conferences and other meetings outside Russia. In addition SPIIRAS put a sincere effort in receiving international scholars, professionals and delegations on the Institute premises; international conferences were organized and held.

The following professional contacts are worth mentioning and include: the Institute of Information and Communication Technologies (the Bulgarian Academy of Sciences); the Belarus Academy of Sciences, the Belarus State University, the Academy of Belarus Ministry of Domestic Affairs and other Belarus organizations like, the Institute of National Security, the Belarus State University of Informatics and Radio-electronics; the Kazakh Academy of Sciences; the Uzbek Academy of Sciences; Novi Sad University (Serbia), Lyublyana University (Slovenia); Riga Technical University (Latvia); Research Economic Institute in Poznan (Poland); Hatfield University (England, UK), University Paris-VII, Research Institute for Informatics in Grenoble, LIMSI-CNRS, University Paul Sabatier, Toulouse (France); UNED University (Spain); Jonkoping University (Sweden); the University of Berlin, Fraunhofer Institute, Rostock University; Bremen University, Ulm University (Germany); Yale Univ (Czechia); University of Helsinki (Finland); Bogazici University (Turkey); Cyprus University of Technology (Greece); Bogazici University in Turkey; Shanghai Maritime University (China); and a number of EC institutions participating in programs like TEMPUS and ERASMUS.

The research works were done on the contracts and orders by Ford Motor Company (USA); the Secretariat of the CIS Interparliamentary Assembly; the EC Program TEMPUS; University of West Bohemia in Plzen (Czechia). A sincere effort has been put in the further development of the research cooperation with Huawei Technologies, Co., Ltd. (China) and in maintaining cooperation and information exchange based on the agreements with the Institute of Space Research and Technologies (the Bulgarian Academy of Sciences).

Intensive scientific exchange totally comprised 67 business trips of 37 SPIIRAS scientists (60 trips to International Conferences, Congresses, Workshops and Exhibitions). 7 trips had been related to the current research contract/agreements/grants.

In turn SPIIRAS received quite a few international scholars, for instance, visa support had been arranged for 25 scientists and professionals; directly at the Institute 54 scientists and doctoral students had been received, including thirteen – from China; three – from Vietnam, nine – from Germany, one- from Italy; one - from Kazakhstan, one – from Norway; two – from the USA, two – from Latvia, two – from Finland, three – from France, five- from Czechia, one – from Sweden, one – from Turkey; ten – from Japan.

Links with the Higher School and Branch Science

The Institute administers seven basic departments in the leading St. Petersburg universities as well as several joint research laboratories.

Basic Departments:

- “Research Automation” at The St. Petersburg State Electrical Engineering University, established in 1979.
- Affiliated department “Mechanics of Controlled Motion” at The St. Petersburg State University, established in 1981.
- “Distributed Intelligent Automation Systems” at The St. Petersburg State Polytechnic University, established in 2009.
- “Information Security” at The St. Petersburg State University of Transport Communications, established in 2010.
- “Information and Automated Systems” at The St. Petersburg State University of Aerospace Instrumentation, established in 2016.
- “Information Systems and Technologies in Economics” at The St. Petersburg University of Economics, established in 2017.
- “Information Technologies in Logistics” at The St. Petersburg School of Economics and Management NRU HSE, established in 2017.

Research Laboratories:

- Joint R&D Laboratory “Problems of Regional Informatization and Management” at The Astrakhan State University, established in 2006.
- R&D Laboratory within CAD Department at Technological Institute of the Southern Federal University, Taganrog, established in 2010.
- R&D Laboratory of Information Technologies in Transport Systems, Power Engineering, Automation and Modeling Systems at Mari State Technical University, established in 2012.
- International Research Laboratory “Intelligent Proactive Protected Technologies and Systems” at ITMO University, established in 2014.
- International Research Laboratory “Intelligent Technologies for SocioCyberPhysical Systems” at ITMO University, established in 2014.
- International Research Laboratory “Information Security of Cyber Physical Systems” at ITMO University, established in 2017.
- Virtual Joint Laboratory at The Military Teaching and Research Center of the RF Air Force “Military Air Force Academy”, Voronezh, established in 2015.
- Joint Research Laboratory for Robotic Systems’ Design and Programming at The St. Petersburg State University of Aerospace Instrumentation, established in 2016.

The Institute also has cooperation with a number of universities in St. Petersburg, Moscow and other cities: Russian State Pedagogical University, Moscow State University, Moscow Engineering and Physical Institute, Moscow Physical and Technical Institute, Moscow State Technical University, Astrakhan State University, Petrozavodsk State University, South Federal University, Northern Caucasian State Technological University, Naval Academy named after N.G. Kuznetsov, Mozhaysky Military Space Academy, etc.

SPIIRAS Scholars deliver lectures for the students of the basic departments and other higher schools in the advanced areas of informatics, information and telecommunication technologies, engage students in research activities, encourage the most capable ones to joint SPIIRAS post-graduate course, teach courses at SPIIRAS centers: Research and Education Center of Computer Studies (RECCS); Research and Education Center “Technologies of Intelligent Space”; Innovation and Education Center of Space Services; Educational Center for Training Certified Specialists in Processing Data of the Earth Remote Sensing.

The Institute organizes and runs the continuing city seminar “Informatics and Computer Technologies”, Prof. Baranov, S. N. is the seminar leader. The seminar on the one hand is aimed at maintaining professional exchange of latest scientific developments in informatics and computer technologies at the city level and on the other hand at involving young researchers in submitting presentations on their own in front of competent scientists. Thus, the seminar contributes to integration of St. Petersburg higher school and academic science, clearly recognizes talented young people and fosters their professional growth.

The Institute did joint research and performed customized works under agreements and contracts with the following organizations: FGUP “CNIImash”, FGUP “GosCSI”, FGUP “NPO “Technomash””, OAO “CTSS”, FGUP “GosNIIAS”, OAO “Russian Space Systems”, FGUP “GKNPC named after M. V. Khrunichev”, OOO “CTS”, OAO “NPO RusBITech”, ZAO SKB “Orion”. In addition the Institute had entered into five other agreements with the following organizations: OOO “Skartel”, Parliamentary Assembly of the CSTO countries, OOO “ASM Reshenia”, APIG “North-West UGSM”, Central Bank of the Russian Federation.

The Institute worked in close cooperation with Secretariat of CIS Countries General Assembly, Secretariat of Parliamentary Assembly of CSTO countries, Committee on Science and Education, Committee on Informatization and Communication of St. Petersburg Government, St. Petersburg Government Information and Analytic Center; with a number of agencies and departments of the Russian Federation Ministries and services.

During the past 2017 year the Institute received 41 grants from the Russian Foundation for Basic Research, four grants of the Russian Federation President, five grants from the Russian Science Foundation and one foreign grant.

Major Publications

Monographs Published by SPIIRAS Scientists:

1. Yusupov R.M., Soldatenko S.A. Chapter 5. «Predictability in Deterministic Dynamical Systems with Application to Weather Forecasting and Climate Modelling» in «Dynamical Systems – Analytical and Computational Techniques». Publisher: InTech. 2017. 272 p.

2. Usychenko V.G., Sorokin L.N. Resistance of Ultra-High Frequency Radio Receivers to Electromagnetic Influences. Monograph. M.: Radiotechnika. 2017. 288 p.: 16 pages of col.pictures.
3. Tulupyev A.L., Tulupyeva T.V., Suvorova A.V., Abramov M.V., Zolotin A.A., Zotov M.A., Azarov A.A., Malchevskaya E.A., Levenets D.G., Toropova A.V., Kharitonov N.A., Birillo A.I., Solnitcev R.I., Mikoni S.V., Orlov S.P., Tolstov A.V. Soft Computations and Measurements. Models and Methods: Monograph. In 3 vol. Volume III / ed. doctor of technical sciences, prof. S.V. Prokopchina. Moscow: ID "Scientific Library", 2017. 300 p.
4. Apatova N.V., Akinins L.N., Boychenko O.V., Gerasimova S.V., et al Information Security of Socio-Economic Systems: Monograph/ ed. Prof. O.V. Boychenko. Simpheropol: IP Zueva, T. V., 2017. 302 p. (Chapt. 1.6, 3.4 – Shishkin, V. M., Chapt. 2.1 – Vorobiev V.I., Evnevich E.L.).
5. Information and psychological and cognitive security: Monograph/ ed. I.F. Kefeli, R.M. Yusupov. St. Petersburg: ID “Petropolis”, 2017. 300 p. (section II, chapter 4 – Osipov V.Yu., section III, chapter. 5 – Shishkin V.M.)
6. Korzun D., Kashevnik A., Balandin S. Novel Design and the Applications of Smart-M3 Platform in the Internet of Things: Emerging Research and Opportunities. IGI Global. 2017. 150 p.
7. Nekrasov A.G., Sokolov B.V., Ataev K.I. “System of Life Cycle Management (transformation into a digital infrastructure)”: Monograph. M.: Techpographcentr. 2017. 155 p.
8. Plebanek O.V. “Global Geopolitics”: Monograph / ed. I.I. Abylgazuev, I.V. Iljin, I.F. Kefeli. M.: Moscow Universiy Publishers. 2017. 280 p. 32 illustration. P.106–141.
9. Information- Psychological and Cognitive Security. Collective Monigraph / ed. I.F. Kefeli, R.M. Yusupov. St. Petersburg: ID “Petropolis”, 2017. 300 p.

Conference Proceedings, SPIIRAS Proceedings:

– Proceedings of the 25th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2017). Igor Kotenko, Yiannis Cotronis and Masoud Daneshtalab (Eds.). St. Petersburg, Russia, March 6-8, 2017. Los Alamitos, California. IEEE Computer Society. 2017. (Kotenko I.V.)
– Proceeding of the 19-th International Scientific and Practical Conference “Ruscrypto’2017”. Solnechnogorsk (Russia), March 21-24, 2017. http://www.ruscrypto.ru/. (Kotenko I.V.)
- Proceedigs of IV International Summer School on Artificial Itelligence for students, graduate students, young scientists and specialists “Intelligent Systems and Technologies: State-of-the-Art and Prospectives – 2017” (ISyT-2017). http://isyt2017.spiiras.nw.ru/wp-

content/uploads/2017/07/isyt-fin.pdf St. Petersburg (Russia), Molodyozhnoe, June 30– July 4, 2017 (Tulupyev A.L.)

- Proceedings of All-Russian Theoretical and Practical Conference “Fuzzy Systems, Soft Computing and Intelligent Technologies – 2017” (FSSC-2017). http://nsmv2017.spiiras.nw.ru/itogi/ v. 1. http://nsmv2017.spiiras.nw.ru/wp-content/uploads/2017/07/nsmv-1-fin-small.pdf ; v. 2. http://nsmv2017.spiiras.nw.ru/wp-content/uploads/2017/07/nsmv-2-fin-small.pdf. St. Petersburg (Russia), July 03-12, 2017 (Tulupyev A.L.)
- Computer Network Security. Lecture Notes in Computer Science, Springer-Verlag, Vol.10446. The 2017 7th International Conference on Mathematical Methods, Models and Architectures for Computer Networks Security (MMM-ACNS-2017). Rak J., Bay J., Kotenko I., Popyack L., Skormin V., Szczypiorski K. (Eds.). August 28-30, 2017, Warsaw, Poland. (Kotenko I.V.)
- Proceedings of the 19-th International Conference: “Speech and Computer” SPECOM-2017. Speech and Computer. Springer International Publishing Switzerland. A. Karpov et al. (Eds.): SPECOM 2017, LNAI 10458, 2017, 831 p. http://www.springer.com/gb/book/9783319664286 . (Karpov A.A.)
- Proceedings of the 2-nd International Conference “Interactive Collaborative Robotics” ICR-2017. Interactive Collaborative Robotics - Springer International Publishing Switzerland. A. Ronzhin et al. (Eds.): ICR-2017, LNAI 10459, 2017, 288 p. http://www.springer.com/kr/book/9783319664705 .(Ronzhin A. L.)
- Information Security of the Russian Regions (ISRR-2017). The X Jubilee St. Petersburg Interregional Conference Information Security of the Russian Regions. Conference Proceedings/SPOISU – SPb., 2017– 418 p. ISBN 978-5-906931–64–1. http://www.spoisu.ru/conf/ibrr2015/materials St.Petersburg, November 1-3, 2017, St.Petersburg, Russia (Yusupov R.M.)
- The 2-nd Interregional Theoretical and Practical Conference “Advanced Lines of Development in National Information Technologies”, “Regional Informatics and Information Security” , Proceedings. Issue No. 3/ SPOISU- SPb., 2017. 346 p. ISBN 978–5–906931–68–9. *(*Yusupov R.M.)
- Proceedings of the 8-th conference IMMOD-2017. SPb. October 18-20, 2017. SPb: NP NOIM. http://simulation.su/static/ru-articles-immod-2017.html (Sokolov B.V.)
- 3-rd International School for Young Scientists “Incident Management and Counteraction to Target Cyber and Physical Attacks in Distributed Large-Scale Crucially Important Systems (IM&CTCPA 2017)", .http://www.comsec.spb.ru/imctcpa17/. St. Petersburg (Russia), December 18-21, 2017 (Kotenko I.V.)

Print Media and Electronic Media – “SPIIRAS Proceedings” Journal (in VAC list since 2011, in the international data base SCOPUS since 2016, CiteScoreTracker 2017: 0,51). ISSN: 2078-9181 E-ISSN: 2078-9599. Subscription Index (Catalogue "Post of Russia"): П5513. Languages: Russian, English. Publication Frequency: 6 issues a year.

Since December of 2015 the Journal publishes papers on two groups of specialities: 05.13.00 Informatics, Computer Science and Control; 01.01.00 Mathematics. The Journal subject with regard to AJSC Scopus: Computer Science. The journal main headings:

- Athematical Modeling and Applied Mathematics.
- Artificial Intelligent, Data and Knowledge Engineering.
- Digital Information and Telecommunication Technologies
- Robotics, Automation and Control Syustems.
- Information Security.

Full-text papers’ versions are available on the journal site: http://proceedings.spiiras.nw.ru/ .

In addition the Institute scientists have published over 400 research papers in various domestic and international journals and collected articles.

2017 Honors and Awards

Yusupov R.M., Kasatkin V.V. – Prize of the St. Petersburg Government for a development: “Integration of education, science and industry as a basis for the information society strategy forming and realization in St. Petersburg”. 2017.

Ronzhin A.L. – Prize of the St. Petersburg Government for the outstanding results in science and technology in 2017 in nomination of electrical and radio engineering, electronics and information technologies in 2017 – the prize named after A. S. Popov: for the series of research developing multimodal systems of the ambient intelligent space.

Zelentsov V.A. – 2017 Scholarsip. For the outstanding achievements and significant contribution to the RF military-industrial complex.

Karpov A.A. – Winner’s Diploma of the 2017 contest for the right to receive the RF President Grants intended for the State support of the young Russian scientists – doctors of sciences in the branch of knowledge “Technical and Engineering Sciences” (Cerificate No. MD-254.2017.8 from the RF President Grants’ Council).

Kipyatkova I.S. – Winner’s Diploma of the 2017 contest for the right to receive the RF President Grants intended for the State support of the young Russian scientists – candidates of sciences in the branch of knowledge “Technical and Engineering Sciences” (Cerificate No. MK-1000.2017.8 from the RF President Grants’ Council).

Kipyatkova I.S. – Winner’s Diploma of the St. Petersburg Grants’ Contest for young candidates of sciences of 2017 from the St. Petersburg Government.

Saveliev A.I. – Winner's Diploma of the St. Petersburg Grants' Contest for young candidates of sciences of 2017 from the St. Petersburg Government.

Karpov A.A. – Winner (1-st place) of the INTERSPEECH Computational Paralinguistics Challenge (ComParE-2017) in «Snoring Sub-Challenge», Stockholm, Sweeden, August 2017.

Kotenko I.V., Saenko I.B., Ageev S.A. - Best Paper Award bestowed at the 7-th international conference on communications, computing, networks and technologies (INNOV 2017). Athens, Greece, October 2017. (https://www.iaria.org/conferences2017/AwardsINNOV17.html)

Chechulin A.A. – Second place in the contest "Automotive Village: CarPWN" at the conference: Positive Hack Days VII (http://phdays.ru).

Chechulin, A. A. – winner of the 2017 contest for the right to receive the RF President Grants intended for the State support of the young Russian scientists – candidates of sciences in the branch of knowledge "Information and Telecommunication Systems and Technologies" Technical and Engineering Sciences (Cerificate No.MK-314.2017.9 from the RF President Grants' Council).

Chechulin A.A., Novikova, Eu.S. – Winners of the 2017 contest for subsidy's provisions to young scientists, young candidates of sciences at higher schools and academic institutions located in St. Petersburg.

Fedorchenko A.V. – The Russian Federation Government Scholarship, the RF FASO Order No. 130 dated March 20, 2017; 2017-2018.

Fedorchenko A.V., Chechulin A.A., Doynikova E.V., Branitsky A.A., Levshun D.S. – winners of the SPIIRAS contest for the best research work (series of research papers).

Saveliev A.I., Ivin A.G., Mikhalchenko D.I., Ronzhin A.L. (Aerospace Bruisers Team) – The 1-st Place Diploma in the League of Humanoid Robots - Football Players: RoboCup Humanoid Soccer KidSize League at the robotics championship «RoboCup Russia Open – 2017».

Shchekotov M.S. – The Russian Federation Government Scholarship for the post- graduates students of full-time education in the programs corresponding to the priority directions in the Russian economy moderniziation and technological development (2016-2017).

Kashevnik A.M. – The 1-st place Diploma of the Jubilee Contest for the best research work of SPIIRAS young scientists and specialist in 2017.

Mikhailov S.A., Petrov M.V., Kashevnik A M. – The best DEMO of the Open Innovations Association Conference FRUCT 20 "Coalition Formation Scenario for Obstacle Overcoming by Mobile Robots".

Lashkov I.B., Kashevnik A.M. – The best DEMO of the Open Innovations Association Conference FRUCT 21 "Dangerous Events Identification and Recommendation Generation for a Vehicle Driver Using a Personal Smartphone".

Main Research Results of Laboratories

Laboratory of Research Automation

Head of the Laboratory: Dr. Tech.Sci. Sergey V. Kuleshov – associative-ontoilogical approach to Internet-content analysis, data processing, digital software defined infocommunication systems, kuleshov@iias.spb.su

Laboratory Staff – 9 members.

Research Activities

Semantic analysis of audio-, video data and texts within the framework of digital programmed infocommunication theory. Software defined reconfigurable infocommunication systems. The methods of energy effective optimization for program defined digital data transmission channels. Active data. Associative – ontological approach to Internet-content analysis, information analysis systems developing, automated monitoring of Internet environment. The basis for theory and methods of digital technologies for cognitive programming of complex spatial forms and their 3D prototyping. The application of mathematical methods to digital signal processing.

Research Fellows

Chief researcher Dr. Tech. Sci., Professor, Honored Scientist of the Russian Federation, Laureate of John von Neumann Prize, Laureate of the Russian Federation Government Prize in Science and Technology Victor V. Alexandrov – algorithmic models, digital programmed infocommunication, informatics, infology, epistemology of growing infocommunication systems, NBICS technologies, alexandr@iias.spb.su

Leading researcher Dr. Tech. Sci., Professor Sergey F. Svinyin – application of modern mathematical methods to digital processing of multidimensional signals, svinyins@mail.ru

Senior researcher Cand. Tech. Sci. Alexandra A. Zaytseva – data processing methods, digital technologies of cognitive programming, cher@iias.spb.su

Researcher Cand. Tech. Sci. Pavel P. Kokorin – infology information systems, kokorin@list.ru

Researcher Cand. Tech. Sci., Associate Professor Valeria A. Alexandrova – technologies of cognitive programming, methods of 3D modeling and 3D prototyping of complex spatial forms, alexandr@iias.spb.su.

Researcher Cand. Tech. Sci Alexey J. Aksenov – digital signal processing, modern methods of scanned 3D data processing and compression, a_aksenov@mail.iias.spb.su

Post graduated students

Konstantin V. Nenausnikov: “Development of methods and algorithms of semantic text analysis for the application in question answering systems”, thesis supervisor is Sergey V. Kuleshov.

Grants and Projects

Alexandrov V. V., Kuleshov S.V., Zaytseva A. A., Aksenov A. – contract No.1/2016. Reference number: “Alebarda-S”, 2016–2017.

Alexandrov V. – RFBR project N 16-29-09482-ofi_m “Prediction of the network-based terrorist threats appearance and elaboration of countermeasures in metropolises”, 2016–2018.

Kuleshov S., Zaytseva A., Aksenov A. – RFBR project N 16-29-12965-ofi_m “The development of methodology and algorithms for creation of empirical model of innovation activity strategic control based on intellectual processing of big data and machine learning”, 2016-2018.

University Courses

SPSPTU, Department of Control Systems and Technology: Knowledge engineering (Victor V. Alexandrov).

SPSPTU, Department of Control Systems and Technology: Intellectual computers (Sergey V. Kuleshov).

Conferences

6th Computer Science On-line Conference 2017 (CSOC 2017), Czech Republic, April 26–29, 2017 – A. Aksenov, A. Zaytseva, S. Kuleshov.

1-st All-Russian Scientific and Practical Conference “Infocommunications and space technologies: current state, problems and solutions”, Kursk, 11-12 May 2017 – V. Alexandrov, A. Zaytseva, S. Kuleshov.

2-nd International Conference on Interactive Collaborative Robotics (ICR 2017), Hatfield, Hertfordshire, UK, 12-16 September, 2017– A. Aksenov, A. Zaytseva, S. Kuleshov.

8-st All-Russian Scientific and Practical Conference “Imitation modeling. Theory and practice” (IMMOD-2017), Saint-Petersburg, 18-20 October, 2017 – A. Aksenov, A. Zaytseva, S. Kuleshov.

3-rd International Scientific Conference “Technological perspective within the frame of Eurasian space: new markets and points of economical growth”, Saint-Petersburg, October 26-28, 2017 – V. Alexandrov, A. Aksenov, A. Zaytseva, S. Kuleshov, K. Nenausnikov.

Membership in Domestic and International societies, editorial boards, etc.

Victor V. Alexandrov – active member of Russian Academy of Natural Sciences. Editorial board member of “Scientific instrumentation” magazine.

Sergey F. Svinyin – member of St. Petersburg Assotiation of Scientists Scientific Council, chairman of St. Petersburg department of

Lomonosov's Foundation, member of the international scientific society "Euroscience".

Sergey V. Kuleshov – Expert of RAS.

Intellectual property registered in the reporting year

The certificate of registration of an electronic resource №2017619096, 15.08.2017, "Software for interactive visualization of objects relations in a form of dynamic unoriented graph", S. Kuleshov, A. Zaytseva.

The certificate of registration of an electronic resource №2017618880, 10.08.2017, "Software for video content monitoring on YouTube service", S. Kuleshov, A. Aksenov.

The certificate of registration of an electronic resource №2017611729, 09.02.2017, "Software for lossless compression and archieving of 3D data represented as point clouds", S. Kuleshov, A. Zaytseva, A. Aksenov.

The certificate of registration of an electronic resource №2017615501, 17.05.2017, "Software for decoding, analysis and visualization of the data structures formed by H264 video codec", S. Kuleshov, A. Zaytseva, A. Aksenov.

The certificate of registration of an electronic resource №2017612257, 17.02.2017, "Software for russian text coherence evaluation", S. Kuleshov, A. Zaytseva.

Recent results

1. The research prototype of the software reconfigurable telecommunication systems accounting for the availability of the hardware resources for software and comprising the methods of hardware resources allocation between software running in public networks. The prototype is implemented in a form of software simulator for testing of the interaction protocols in unrouted geo-distrubuted networks [1, 4, 5, 15].
2. The software for visual analysis of the compressed video stream parameters enabling flexible optimization of video codec settings within the framework of software defined systems was developed. The visualization of key frame position, changes of plane and motion of objects in frame allows to optimize coding parameters such as frequency of key frames, quantization, enthropy coding methods etc. [7, 9].
3. The method for automatic landing and take-off implementation for multirotor unmanned aircraft based on computer vision principles was developed [2, 5, 6, 11].
4. The methods for content filtering within the framework of associative-ontology approach were developed to address following problems:

– social network monitoring including temporal content changes in order to access the degree of information security;

– analysis of the annotated text documents within the context of innovation activity in Russia;
– public question answering systems development. [8, 9, 12, 13, 14].

5. The conclusions of the theory of multidimensional finite energy signals sampling were confirmed on the examples of digital processing of the measured thermal and geomagnetic field data. [3, 10, 16].

References

Publications indexed in WoS, Scopus

1. Sergey V. Kuleshov, Alexey J. Aksenov, and Alexandra A. Zaytseva. Software-Defined Data Formats in Telecommunication Systems. Volume 575 of the series Advances in Intelligent Systems and Computing 2017 pp 326-330.
2. Aksenov, A.Y., Kuleshov, S.V., Zaytseva, A.A. An application of computer vision systems to unmanned aerial vehicle autolanding. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics). 2017, pp. 105-112.
3. Popov A.I., Svinyin S.F. Application of Finite basis Splines in Reconstructing Electrogastroenterography Signals. SPIIRAS Proceedings. 50(1), 93-111 (2017). (in Russ).

Publications indexed in Russian Science Citation Index

4. Kuleshov S.V., Zaytseva A.A., Aksenov A.Y. Data processing technologies: programming and non-programming. J. «Informatization and communication». 2017. Issue. 3. Pp. 34-39. (In Russ).
5. Antsev G.V., Alexandrov V.V., Kuleshov S.V., Zaytseva A.A. Perspective infocommunication technologies for aviation. Radio industry. 2017;(4):103-109. DOI:10.21778/2413-9599-2017-4-103-109 (In Russ).
6. Aksenov A.Y., Zaytseva A.A., Kuleshov S.V., Nenausnikov K.V. Possible landing support variants while unmanned multi-rotor flying vehicle's off-line control. Trudy MAI, 2017, Issue №96, URL: http://trudy.mai.ru/published.php?ID=85880 (In Russ).
7. Sergey V. Kuleshov, Alexandra A. Zaytseva. Temporal analysis of H.264 codec. Journal of Instrument Engineering. 2017, Vol. 60, No 11. Pp. 1092-1095 (In Russ).

Other publications

8. Alexandrov V.V., Kuleshov S.V., Zaytseva A.A. The problems of digital infocommunication codex creation. Proceedings of the 1-st All-Russian Scientific and Practical Conference in 2 parts “Infocommunications and space technologies: current state, problems and solutions”. P.2, 2017, pp. 89–100.

9. Alexandrov V.V., Kuleshov S.V., Mikhailov S.N. The statement which opened the way to digital programmed world. Proceedings of the 1-st All-Russian Scientific and Practical Conference in 2 parts “Infocommunications and space technologies: current state, problems and solutions”. P.2, 2017, pp. 10–23.
10. Popov A.I., Svinyin S.F., Zainitdinov H.N. Metody analiza signalov elektrogastroenterografii na priznaki nestatsionarnosti. Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of 3-nd International Scientific Conference, 2017.
11. Kuleshov S.V., Aksenov A.Y. Primeneniye sistemy komp'yuternogo zreniya dlya realizatsii avtoposadki BPLA. Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of 3-nd International Scientific Conference, 2017.
12. Kuleshov S.V., Zaytseva A.A. Algoritmy avtomatizirovannoy generatsii baz dannykh ontologiy na osnove assotsiativno-ontologicheskogo podkhoda. Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of 3-nd International Scientific Conference, 2017.
13. Nenausnikov K.V., Kuleshov S.V. Printsipy avtomatizirovannogo postroyeniya baz dannykh dlya voprosno-otvetnykh sistem s ispol'zovaniyem semanticheskogo analiza tekstov. Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of 3-nd International Scientific Conference, 2017.
14. Alexandrov V.V., Zaytseva A.A. Primeneniye glossariyev kul'turologicheskikh kanonov v razlichnykh sotsial'nykh gruppakh dlya otsenki stepeni terroristicheskoy ugrozy. Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of 3-nd International Scientific Conference, 2017.
15. Kuleshov S.V., Zaytseva A.A., Aksenov A.Y. Imitatsionnoye modelirovaniye infokommunikatsionnykh vzaimodeystviy v georaspredelennykh setyakh. Proceedings of 8-st All-Russian Scientific and Practical Conference “Imitation modeling. Theory and practice” (IMMOD-2017).
16. Svinyin S.F., Zainitdinov H.N. Method of samples of multidimensional signals based on polynomial splines and wavelet functions. TUIT bulletin. 2017. No 2 (42), pp. 56-70. (In Russ).

Intelligent Systems Laboratory

Head of Laboratory: Dr. Tech. Sci., Professor, Honored Scientist of the Russian Federation, Vladimir I. Gorodetsky – Artificial Intelligence, in particular, Multi-agent systems (MAS), technology and software tools, MAS applications, agent-oriented modeling and simulation, machine learning and data mining, distributed data mining, data and information fusion, ontology, self-organizing B2B networks, recommender systems, big data mining, semantic data models, association and causal data analysis, semantic NL-data clustering, teamwork of agents, self-organizing Internet of Things. gor@iias.spb.su, http://space.iias.spb.su/ai/gorodetsky.

Laboratory Staff – 7 members.

Research Activities

Multi-agent systems (MAS), technology and software tools, MAS applications, agent-oriented modeling and simulation, machine learning and data mining, distributed data mining, data and information fusion, ontology, self-organizing B2B networks, transportation logistics, air traffic control, recommender systems, big data mining, semantic data models, association and causal data analysis, semantic NL-data clustering, teamwork of agents, self-organizing Internet of Things.

Research Fellows

Senior researcher Cand. Tech. Sci. Oleg V. Karsaev – Artificial Intelligence, multi-agent systems and software tools, multi-agent applications in transportation logistics, real-time intelligent planning and scheduling, air traffic control, p2p architectures and protocols, small satellite group control and self-organization. ok@iias.spb.su.

Researcher Cand. Tech. Sci. Olga N. Tushkanova – Artificial Intelligence, in particular, multi-agent system technology, machine learning and data mining, distributed data mining, ontology, recommender systems, big data mining, semantic data models, association and causal data analysis, semantic NL-data clustering, Programming. tushanova@iias.spb.su.

Researcher Vladimir V. Samoylov (part time) – Artificial Intelligence, in particular, , machine learning and data mining, distributed data mining, ontology, recommender systems, big data mining, transportation logistics, business analytics samovl@iias.spb.su

Researcher Vakhtang V. Kislyakov – Artificial Intelligence, ontology design automation, intelligent planning and scheduling, user interfaces, data bases, programming. vakh@iias.spb.su.

Junior researcher Leonid V.Boykov, (part time) – Artificial Intelligence, in particular, multi-agent systems, agent platforms, teamwork of robots, robot programming, software development. boykov@iias.spb.su.

Junior researcher Valeriya V. Bashlovkina, (part time) – Computer vision of robots, 3D scene reconstruction, teamwork of agents, robot programming, bash@iias.spb.su.

Senior researcher Cand. Tech. Sci.Mikhail V. Tsvetkov – Object-oriented analysis, design, programming, simulation, tmv@oogis.ru

Post-graduate Students

Leonid V.Boykov – Teamwork of Autonomous Agents with Application to Collective Robotics. (Supervisor Gorodetsky V.).

Valeriya V. Bashlovkina – Computer Vision of Robots and Cognitive 3D Scene Reconstruction (Supervisors Gorodetsky V. and Stankevich L.).

Grants and Projects

Gorodetsky V. (Sc. L.). Research and Developments on models and distributed algorithms for teamwork of agents, and its potential applications to collective robotics. Project № 214 of the Presidium RAS Program 1.5П. "Intelligent Information Technologies and Systems. (2016–2017).

Conferences, exhibitions

Russian Conference on Perspective Control Systems and Tasks, 2-9 April 2017, Divnomorskoe – Gorodetsky V.

International Congress on Artificial Intelligence and Information Technologies (AIS-2016), Divnomorskiy, 2-9 Sept. 2017 – Gorodetsky V.

25th International EUROMICRO Conference on Parallel, Distributed and Network-Based Processing. March 6-8, 2017, St. Petersburg, Russia – Gorodetsky V.

1-st International Scientific Conference on Mind Models and Integration of Information and Control Systems. 7-10 December 2017, Nal'chik, Russia. –plenary talk of Gorodetsky V.

Russian Conference on Theoretical and Applied Problems of Automated Systems for Military Applications. MSA after A.F. Mozhaisky, November 2017 –Karsaev O.

International Conference on Information Fusion and Geoinformation Systems (IF&GIS'17), Shanghai, China, 10–12 May 2017 –Tsvetkov M.

17th International Multidisciplinary Geoconference (SGEM2017), May 28 – June 6, Varna, Bulgaria –Tsvetkov M.

2017 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering, February 1 – 3, 2017, St. Petersburg, Russia. – Boykov L. and Bashlovkina V.

IV-th International Summer School for Junior Researchers. On Intelligent Systems and Technologies: State-of-the-Art and Perspectives-2017, June 30-July 2 2017, St. Petersburg, Russia, – Gorodetsky V.

Membership in Domestic and International societies, Editorial boards, etc.

Prof. Gorodetsky V. – Member of the Russian and European Associations for Artificial Intelligence, member of IEEE, IEEE Computer Society, International Society of Information Fusion (ISIF), International Federation of Autonomous Agents and Multi-agent Systems (IF AAMAS), Editorial Board member of Journal on "Design Ontology", Editorial Board member of the International Journal "Data Science and Analytics", Springer.

Recent Results

1. The basic scenario and protocols intended for group control of self-organizing surveillance system distributed over small satellite cluster components are developed. The target distributed surveillance system is modelled as a networked meta-object of dynamic topology with the nodes

representing both low-orbit satellites of the cluster and Earth-located control and communication components. The surveillance system conceptual model and architecture are based on multi-agent system principles. This model makes it possible to specify the target surveillance system as a self-organizing networked meta-system comprising of autonomous entities (agents) operating on peer-to-peer basis. The resulting model is capable to specify distributed coordination of autonomous agents' collective behavior provided with situational awareness, self-organizing planning abilities and on-line control of system goal-oriented group behavior.

Publicatins

Papers Published in Editions Indexed by WoS, Scopus

1. Gorodetsky V., Skobelev P. Mult-agent technology for industrial Applications: Reality and perspectives. SPIIRAS Proceedings, 2017, vol. 6, P. 11– 5. (In Russ.).
2. Tsvetkov M., Rubanov D. An intelligent GIS-based approach to vessel route planning in the Arctic Sea, Proceedings of International Conference on Information Fusion and Geoinformation Systems (IF&GIS'17). Popovich et al. (Eds.), 2017. P. 71–79.
3. Ivakin Y., Tsvetkov M. GIS tool for geochronological tracking and historical data analysis, 17th International Multidisciplinary Geoconference SGEM2017, 2017, Book2, vol.2, P. 759–766.
4. Bashlovkina V., Boykov L., Stankevich L. Software Communication Platform Architecture for Robots Group Management in Autonomous Mission. 2017 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering, 2017. P. 774–778.

Papers Published in Russian Editions Indexed by RSCI

5. Gorodetsky V., Bukhvalov O., Skobelev P., Mayorov I. Current State-of-the-Art and Perspectives for Industrial applications of Multi-agent Systems. Large Scale Systems Control, vol. 66, 2017, pp. 94–157. (In Russ.).
6. Gorodetsky V.I., Bukhvalov O.L. Self-Organized B2B Production Networks. Part 1. Conception and Basic Tasks. Mechatronics, Automation, Control, vol. 18 issue 11, 2017, P. 776–781. (In Russ.).
7. Gorodetsky V.I., Bukhvalov O.L. Self-Organized B2B Production Networks. P.2. Architecture and Algorithmic Support. Mechatronics, Automation, Control, vol. 18 issue 12, 2017, P. 829–839. (In Russ.).
8. Gorodetsky V.I., Karsaev O.V. Distributed Surveillance System Based on Self-organizing Collective behavior of Small Satellite Cluster. Transactions of South Federal University (Technical Sciences), Vol. 3, 2017, P. 141–155. (In Russ.).
9. Gorodetsky V.I., Bukhvalov O.L. Conceptual Model and Architecture of Infrastructure for Collective Robotic Control System. Robotics and Technical Cybernetics, vol. 1, 2017, P. 33–44. (In Russ.).

Other Publications

10. Gorodetsky V. Internet of Agents: From Set of Autonomous Agents to Network Object. Proc. of AAMAS-2017 Intern. Workshop on Internet of Agents, May 8, 2017 San Paolo, Brazil, P. 1–17.

Laboratory of Speech and Multimodal Interfaces

Head of Laboratory: Dr. Tech. Sci., Associate Professor Alexey A. Karpov – development of speech and multimodal human-computer interfaces and systems, karpov@iias.spb.su, http://hci.nw.ru

Laboratory staff: 12 members

Research Activities

Research and development of methods for natural human-computer interaction. Automatic audio-visual speech recognition and understanding. Multimodal user interfaces. Intelligent rooms and spaces. Assistive information technologies and systems for disabled people. Computational paralinguistics.

Research Fellows

Senior researcher Cand. Tech. Sci. Irina S. Kipyatkova – methods for language and acoustic modeling for automatic Russian speech recognition systems, kipyatkova@iias.spb.su

Senior researcher Cand. Tech. Sci. Anton I. Saveliev – cross-platform software and mobile services for teleconferencing, saveliev@iias.spb.su

Researcher Vasilisa O. Verkhodanova – study of non-verbal phenomena in spontaneous speech, probabilistic models of speech disfluencies, verkhodanova@iias.spb.su

Junior researcher Denis V. Ivanko – research and development of an automatic system of audiovisual Russian speech recognition with the use of a microphone and a high-speed video camera, ivanko@iias.spb.su

Junior researcher Dmitry A. Ryumin – methods and software for recognition of elements of Russian sign language, dl_03.03.1991@mail.ru

Junior researcher Alexander V. Denisov – methods and software for motion control of a robot with an anthropomorphic kinematic scheme, sdenisov93@mail.ru

Junior researcher Oksana V. Verkholyak – automatic recognition of speaker's emotional states using voice characteristics and tonality of the text of the statement, overkholyak@gmail.com

Bachelor and Master Students

Bachelor students at the Department of Neuroinformatics and Robotics of SPb SUAI-SPIIRAS: 3 (thesis supervisor – Kipyatkova, I.S.);

Master students at the Department of Speech Information Systems of the ITMO University: 2 (thesis supervisor – Karpov, A.A.).

Grants and Projects

Karpov A.A. – Grant of the President of the Russian Federation № MD-254.2017.8 «Development and research of an automatic system for recognition of human's natural emotions from speech», 2017-2018.

Kipyatkova I.S. – Grant of the President of the Russian Federation № МК-1000.2017.8 «Development of a neural network based acoustic model for a Russian speech-to-text conversion system», 2017-2018.

Verkhodanova V.O. – Project of the Russian Foundation for Basic Research (RFBR) № 15-06-04465-a «Study of the acoustical cues differentiating phonational speech disfluencies in the spontaneous speech», 2015-2017.

Karpov A.A. – Project of RFBR № 15-07-04415-a «Models and methods of audio-visual signal processing for bimodal Russian speech recognition», 2015-2017.

Kipyatkova I.S. – Project of RFBR № 15-07-04322-a «Research of acoustic and language models based on artificial neural networks for an automatic large vocabulary Russian speech recognition system», 2015-2017.

Saveliev A.I. – Project of RFBR № 15-07-06774-a «Development of methods of multimedia data processing and exchange in peer-to-peer web application of multipoint videoconferencing», 2015-2017.

Karpov A.A. – Project of RFBR № 16-37-60100-mol_a_dk «Development of a universal assistive information technology based on multimodal human-computer interfaces», 2016-2019.

Kipyatkova I.S. – Grant-subsidy of the Committee on Science and Higher Education of the Government of St. Petersburg for young PhD researchers «Development and research of neural network hybrid acoustic models for the Russian speech recognition system», 2017.

Saveliev A.I. – Grant-subsidy of the Committee on Science and Higher Education of the Government of St. Petersburg for young PhD researchers «Development of a configuration method for the optimal arrangement of heterogeneous IoT-network modules», 2017.

Karpov A.A. – Project «Development of a technical project for the voice control module software for a robotic exoskeleton for medical purposes" under a contract with the Volga State Technological University (VSTU) within the framework of the integral project in the framework of the Government Statement No. 218 «On measures of state support for the development of cooperation between Russian higher education institutions and organizations, implementing complex projects for the creation of high-tech production», 2017.

Karpov A.A. – Contract with Huawei company, 2017-2018.

Karpov A.A. – Contract with ASM Solutions company, 2017.

University Courses

ITMO University: Speech recognition (Karpov A.A.)

SUAI University: Information systems; Automated information management systems (Kipyatkova I.S).

Conferences

19th International Conference "Speech and Computer" SPECOM-2017, 12-16 September 2017, Hatfield, Great Britain – Kipyatkova I.S., Verkhodanova V.O., Karpov A.A. (conference co-organization);

18th International Conference INTERSPEECH-2017, 20-24 August 2017, Stockholm, Sweden – Karpov A.A., Kipyatkova I.S.;

6th International Conference on Artificial Intelligence and Natural Language AINL-2017, September 20-23, 2017, St. Petersburg, Russia – Verkholyak O.V., Markovnikov N.M.;

2nd International Seminar "Photogrammetric and computer vision techniques for video surveillance, biometrics and biomedicine" PSBB-2017, May 15-17, 2017, Moscow, Russia – Ryumin D.A.;

IEEE International Conference "Processing of image and sound signals in the context of neurotechnologies" SPCN-2017, June 26-30, 2017, St. Petersburg, Russia – Verkholyak O.V., Karpov A.A.

2nd International Conference on Interactive Collective Robotics ICR-2017, September 13-14, 2017, Hatfield, Great Britain – Karpov A.A., Saveliev A.I., Ivanko D.V.;

International Scientific and Technical Conference "Zavalishin's Readings - 2017", April 18, 2017, St. Petersburg, Russia – Saveliev A.I., Denisov A.V.;

Scientific and Technical Seminar of Huawei 2nd Algorithm Workshop, June 19, 2017, St. Petersburg, Russia – Ivanko D.V.

Scientific and organizational activity

Organization and holding of the 19th International Conference "Speech and Computer" SPECOM-2017. http://specom.nw.ru/history/sites/2017 Hatfield (UK), September 12-16, 2017 – Karpov A.A. (chairman of the program committee). Proceedings published: Speech and Computer. Springer International Publishing Switzerland. A. Karpov et al. (Eds.): SPECOM 2017, LNAI 10458, 2017, 831 p. http://www.springer.com/gb/book/9783319664286

Organization and holding of the special session "Digital Revolution for Under-resourced Languages" at the 18th International Conference INTERSPEECH-2017, Stockholm, Sweden, August 20-24, 2017 – Karpov A.A. (co-organizer of the special session) http://ahclab.naist.jp/DigRevURL

Organization of a special issue of the International journal "Journal of Electrical and Computer Engineering" (indexed in Web of Science and Scopus, Hindawi, USA) – Karpov A.A. (invited editor) https://www.hindawi.com/journals/jece/si/324109

International Cooperation

Joint research and organization of scientific events in cooperation with the University of West Bohemia in Pilsen (Czech Republic), Bo-

gazici University (Turkey), Namık Kemal University (Turkey), University of Patras (Greece), Leipzig University of Telecommunications (Germany), Dresden University of Technology (Germany), Ulm University (Germany), United Institute of Information Problems of the National Academy of Sciences of Belarus, University of Aizu (Japan), the University of Hertfordshire (Great Britain), Huawei company (China).

Membership in Domestic and International societies, editorial boards, etc.

Alexey A. Karpov. – expert of RAS; member of the European Association for Signal Processing (EURASIP), EURASIP Local Liaison Officer in Russia, member of the International Speech Communication Association (ISCA), member of the International Association for Pattern Recognition (IAPR); Editorial board member of the journals "Speech Technology" (Moscow) and "Informatics" (Minsk); Guest editor of the Journal on Multimodal User Interfaces (Springer), Speech Communication (Elsevier) and Journal of Electrical and Computer Engineering (Hindawi); Reviewer of several International journals (IEEE/ACM Transactions on Audio, Speech and Language Processing; IEEE Transactions on Affective Computing; IEEE Transactions on Biomedical Engineering; Speech Communication; Computer Speech & Language; Pattern Recognition Letters; Pattern Recognition; Language Resources and Evaluation; Soft Computing; Journal of Information Science; Acoustical Physics, etc.); Co-chair of the International Conference SPECOM series; Technical/Program Committee member of the International conferences (INTERSPEECH, ICASSP, ICPR, SLTU, SPECOM, ISNN, HBU, etc.).

Irina S.Kipyatkova – technical/programme committee member of the International Conferences INTERSPEECH, SPECOM, ISNN. Member of the organizing committee of the International Conference SPECOM series; Reviewer of Journal on Multimodal User Interfaces (Springer), Journal of Electrical Engineering and Computer Engineering (Hindawi).

Anton I. Saveliev – Member of the organizing committees of international conferences SPECOM, ICR, Zavalishin's Readings.

Vasilisa O. Verkhodanova – Member of the program committee of the international conference SPECOM.

Intellectual Property registered in the reporting year

Programs and Data Bases

Patent RF for the invention № 2618389 issued on 03.05.2017: Karpov, A.A., Ronzhin, A.L. "A method for hands-free control of the mouse cursor".

Certificate on Database registration No. 2017621219 issued on 19.10.2017: Karpov, A.A., Ivanko, D.V., Ryumin, D.A, Kipyatkova, I.S.

"Audiovisual corpus of the continuous Russian speech with high-speed video recordings (HAVRUS)".

Certificate on Software Registration No. 2017618845 issued on 10.08.2017: Karpov, A.A., Ryumin, D.A., Ivanko, D.V., Kipyatkova, I.S., Budkov, V.Y. "Audio-visual Russian speech recognition system with a microphone and a high-speed video camera (AVSpeechRecognition)".

Certificate on Software Registration No. 2017661398 issued on 11.10.2017: Saveliev, A.I., Karasev, E.Y. "Component for managing user accounts in the Internet-communication system."

Certificate on Software Registration No. 2017661405 issued on 12.10.2017: Saveliev, A.I., Karasev, E.Y. "Server data management and storage system of the peer-to-peer videoconferencing application".

Certificate on Software Registration No. 2017661406 issued on 12.10.2017: Saveliev, A.I., Karasev, E.Y. "Software platform for management and configuration of modular, communication web applications."

Recent Results

1. A multi-modal system for audio-visual continuous Russian speech recognition (AVSpeechRecognition) using high-speed video data has been developed. It simultaneously analyses audio from a microphone and video from a high-speed camera (using JAI Pulnix camera with 200 fps at the resolution of 640x480) and fuses information with Coupled Hidden Markov Models (CHMM). Experimental setup and collected multimodal database HAVRUS have allowed us to explore the impact brought by the high-speed video recordings with various frames per second (fps) starting from standard 25 fps up to high-speed 200 fps, as well as to increase the word recognition accuracy and to improve robustness of speech recognition in conditions of dynamic acoustic noises with SNR below 10dB [10, 19].
2. Acoustic models based on artificial neural networks with different architectures have been developed and studied. Time Delay Neural Networks (TDNN), Convolutional Neural Networks, Recurrent Convolutional Neural Networks, Long Short-Term Memory (LSTM) and Bi-directional LSTM models were applied. The developed models were embedded in our very large vocabulary automatic Russian speech recognition system (the vocabulary size is more than 150K word-forms) [8, 16].
3. Novel acoustic feature extraction methods for automatic recognition of speaker's emotional states from speech using deep recurrent neural networks with Long Short-Term Memory allowing for long-range time dependency modelling and capturing time structure of the signal were proposed in order to enhance feature representation of the time signal. Furthermore, combination techniques were developed to merge the new feature extraction methods with existing

ones, showing effectiveness of joint representation in comparison with standalone approaches [17, 2].

4. A prototype of a computer system for automatic recognition of manual gestures using Microsoft Kinect 2.0 has been developed. The prototype is able to recognize continuous fingerspelling gestures, as well as sequences of digits in the Russian and Kazakh sign languages. In the Russian sign language, there are 33 letters, which are demonstrated in the form of static gestures. In Kazakh sign language, Russian fingerspelling alphabet is supplemented with additional 9 letters, which are shown dynamically (the vocabulary now contains only 52 manual gestures). A visual database of isolated sign gestures using Kinect 2.0 has been collected, it contains recordings of 2 persons (male and female) demonstrating gestures of the sign language, and every demonstrator has repeated each of 52 gestures at least 30 times [7].

5. Architectures, algorithms and software for automatic processing and transmission of multimodal information streams in video conferencing systems have been developed. A peer-to-peer approach is proposed for organizing the process of exchanging multimodal information between videoconferencing participants. The proposed approach has made it possible to reduce the amount of data transferred in the process of video conferencing, as well as to reduce the consumption of server resources and distributed heterogeneous devices, which enables efficient transmission and processing of speech and multimodal data [25].

6. The computer system for paralinguistic analysis of natural speech has been improved. The system uses a set of state-of-the-art methods for extracting multiple informative features from audio signals, filtering and multi-level data normalization, machine learning and classification based on artificial neural networks such as Extreme Learning Machines. This system took the first place (winner) at the 9th INTERSPEECH Computational Paralinguistics Challenge ComParE-2017 in "Snoring Sub-Challenge" (Stockholm, Sweden) [5].

Awards

Certificate of winner of the grant of the President of the Russian Federation for state support of young Russian scientists – doctors of sciences in the field of knowledge "Technical and engineering sciences" (Certificate No. MK-254.2017.8 of the Council on grants of the President of the Russian Federation) – Karpov A.A.

Certificate of winner of the grant of the President of the Russian Federation for state support of young Russian scientists – candidates of sciences in the field of knowledge "Technical and engineering sciences" (Certificate No. MK-1000.2017.8 of the Council on grants of the President of the Russian Federation) – Kipyatkova I.S.

Diploma of the winner of the St. Petersburg grant competition in 2017 for young Candidates if Sciences from the Government of St. Petersburg – Kipyatkova I.S.

Diploma of the winner of the St. Petersburg grant competition in 2017 for young Candidates if Sciences from the Government of St. Petersburg – Saveliev A.I.

The winner (1st place) of the INTERSPEECH Computational Paralinguistics Challenge (ComParE-2017) in the "Snoring Sub-Challenge", Stockholm, Sweden, August 2017 – Karpov A.A.

References

Papers published in journals and editions indexed by WoS, Scopus

1. Kipyatkova I., Karpov A. A Study of Neural Network Russian Language Models for Automatic Continuous Speech Recognition Systems. Automation and Remote Control, Springer, Vol. 78, No. 5, 2017, pp. 858-867. https://doi.org/10.1134/S0005117917050083 (WoS JCR=0,492, Scopus SJR=0,34, Q2).
2. Kaya H., Salah A., Karpov A., Frolova O., Grigorev A., Lyakso E. Emotion, Age, and Gender Classification in Children's Speech by Humans and Machines. Computer Speech and Language, Elsevier, 2017, Vol. 46, pp. 268-283. https://doi.org/10.1016/j.csl.2017.06.002 (WoS JCR=1,900, Scopus SJR=0,168, Q1).
3. Petrovsky A., Wan W., Rosa-Zurera M., Karpov A. Signal Processing Platforms and Algorithms for Real-life Communications and Listening to Digital Audio. Journal of Electrical and Computer Engineering, Hindawi, Volume 2017, 2017, Article ID 2913236, http://dx.doi.org/10.1155/2017/2913236 (WoS, Scopus SJR=0,168, Q3).
4. Basov O., Kipyatkova I., Saveliev A. Multimodal Subscriber Interfaces for Infocommunication Systems. Computing and Informatics, Slovak Academy of Sciences, Vol. 36, 2017, pp. 908-924. http://dx.doi.org/10.4149/cai_2017_4_908 (WoS, Scopus SJR=0,253, Q3).
5. Kaya H., Karpov A. Introducing Weighted Kernel Classifiers for Handling Imbalanced Paralinguistic Corpora: Snoring, Addressee and Cold. In Proc. INTERSPEECH-2017, Stockholm, Sweden, ISCA, 2017, pp. 3527-3531. http://isca-speech.org/archive/Interspeech_2017/pdfs/0653.PDF.
6. Akhtiamov O., Sidorov M., Karpov A., Minker W. Speech and Text Analysis for Multimodal Addressee Detection in Human-Human-Computer Interaction. In Proc. INTERSPEECH-2017, Stockholm, Sweden, ISCA, 2017, pp. 2521-2525. http://isca-speech.org/archive/Interspeech_2017/pdfs/0501.PDF.

7. Ryumin D., Karpov A. Towards Automatic Recognition of Sign Language Gestures using Kinect 2.0. In Proc. 19th International Conference on Human-Computer Interaction HCII-2017, Vancouver, Canada, Springer LNCS vol. 10278, 2017, pp. 89-104. https://link.springer.com/chapter/10.1007/978-3-319-58703-5_7.
8. Kipyatkova I. Experimenting with Hybrid TDNN/HMM Acoustic Models for Russian Speech Recognition. In Proc. 19th International Conference on Speech and Computer SPECOM-2017, Hatfield, UK, Springer LNCS 10458, 2017, pp. 362-369. https://link.springer.com/chapter/10.1007/978-3-319-66429-3_35.
9. Verkhodanova V., Shapranov V., Kipyatkova I. Hesitations in Spontaneous Speech: Acoustic Analysis and Detection. In Proc. 19th International Conference on Speech and Computer SPECOM-2017, Hatfield, UK, Springer LNCS vol. 10458, 2017, pp. 398-406. https://link.springer.com/chapter/10.1007/978-3-319-66429-3_39.
10. Ivanko D., Karpov A., Kipyatkova I., Ryumin D., Saveliev A., Budkov V., Ivanko Dm., Železný M. Using a High-Speed Video Camera for Robust Audio-Visual Speech Recognition in Acoustically Noisy Conditions. In Proc. 19th International Conference on Speech and Computer SPECOM-2017, Hatfield, UK, Springer LNCS vol. 10458, 2017, pp. 757-766.: https://link.springer.com/chapter/10.1007/978-3-319-66429-3_76.
11. Akhtiamov O., Pugachev A., Karpov A., Sidorov M., Minker W. Are You Addressing Me? Multimodal Addressee Detection in Human-Human-Computer Conversations. In Proc. 19th International Conference on Speech and Computer SPECOM-2017, Hatfield, UK, Springer LNCS vol. 10458, 2017, pp. 152-161. https://link.springer.com/chapter/10.1007/978-3-319-66429-3_14.
12. Hlaváč M., Gruber I., Železný M., Karpov A. Semi-automatic Facial Key-point Dataset Creation. In Proc. 19th International Conference on Speech and Computer SPECOM-2017, Hatfield, UK, Springer LNCS vol. 10458, 2017, pp. 662-668. https://link.springer.com/chapter/10.1007/978-3-319-66429-3_66.
13. Gruber I., Hlaváč M., Železný M., Karpov A. Facing Face Recognition with ResNet: Round One. In Proc. 2nd International Conference on Interactive Collaborative Robotics ICR-2017, Hatfield, UK, Springer LNCS vol. 10459, 2017, pp. 67-74. https://link.springer.com/chapter/10.1007/978-3-319-66471-2_8
14. Kryuchkov B., Syrkin L., Usov V., Ivanko D., Ivanko Dm. Using Augmentative and Alternative Communication for Human Robot Interaction during Maintaining Habitability of a Lunar Base. In Proc. 2nd International Conference on Interactive Collaborative Robotics ICR-2017, Hatfield, UK, Springer LNCS vol. 10459, 2017, pp. 95–104.

15. Pugachev A., Akhtiamov O., Karpov A., Minker W. Deep Learning for Acoustic Addressee Detection in Spoken Dialogue Systems. In Proc. 6th International Conference on Artificial Intelligence and Natural Language AINL-2017, St. Petersburg, Communications in Computer and Information Science, Springer, vol. 789, pp. 45-53. https://link.springer.com/chapter/10.1007/978-3-319-71746-3_4.
16. Markovnikov N., Kipyatkova I., Karpov A., Filchenkov A. Deep neural networks in Russian language recognition. In Proc. 6th International Conference on Artificial Intelligence and Natural Language AINL-2017, St. Petersburg, Springer, Communications in Computer and Information Science, vol. 789, pp. 54-67. https://link.springer.com/chapter/10.1007/978-3-319-71746-3_5.
17. Verkholyak O., Karpov A. Combined feature representation for emotion classification from Russian speech. In Proc. 6th International Conference on Artificial Intelligence and Natural Language AINL-2017, St. Petersburg, Communications in Computer and Information Science, Springer, vol. 789, pp. 68-73. https://link.springer.com/chapter/10.1007/978-3-319-71746-3_6.
18. Vatamaniuk I., Budkov V., Kipyatkova I., Karpov A. Methods and Algorithms of Audio-Video Signal Processing for Analysis of Indoor Human Activity. In: Favorskaya M., Jain L. (eds.) Computer Vision in Control Systems-4. Intelligent Systems Reference Library, Springer, vol. 136. 2018, pp. 139-173.: https://doi.org/10.1007/978-3-319-67994-5_6.
19. Ryumin D., Karpov A. Parametric representation of the speaker's lips for multimodal sign language and speech recognition. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. In Proc. ISPRS International Workshop "Photogrammetric and computer vision techniques for video Surveillance, Biometrics and Biomedicine" PSBB-2017, Moscow, 2017, pp. 155-161. https://doi.org/10.5194/isprs-archives-XLII-2-W4-155-2017.
20. Kryuchkov B., Usov V., Tchertopolokhov V., Ronzhin A., Karpov A. Simulation of the "cosmonaut-robot" system interaction on the lunar surface based on methods of machine vision and computer graphics. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. In Proc. ISPRS International Workshop "Photogrammetric and computer vision techniques for video Surveillance, Biometrics and Biomedicine" PSBB-2017, Moscow, 2017, pp. 129-133. https://doi.org/10.5194/isprs-archives-XLII-2-W4-129-2017.

Papers published in Russian journals and editions indexed by RCSI

21. Kipyatkova I., Karpov A. Research of neural network models of the Russian language for automatic speech recognition systems. Avtomatika i Telemekhanika, vol. 78, No. 5, 2017, pp. 110-122.
22. Velichko A., Budkov V., Karpov A. Analytical Survey of Computational Paralinguistic Systems for Automatic Recognition of Deception in Human Speech. Informatsionno-Upravliaiushchie Sistemy, No. 5, 2017, pp. 30-41.
23. Kryuchkov B., Karpov A., Usov V., Chertopolokhov V. Multi-level monitoring of the gesture control of a mobile robot with out-of-ship activities on the lunar surface. Proceedings of the XIX International Conference "Problems of Control and Modeling in Complex Systems" PUMSS-2017, Samara, 2017, pp. 153-159.
24. Budkov V., Saveliev A., Basov O., Ronzhin A. Corpus of Russian speech for the study of the truth of the transmitted message. Proceedings of the 7th Interdisciplinary Workshop "Analysis of Conversational Russian Speech" AP3-2017, St.Petersburg, 2017, pp. 21-25.
25. Karasev E., Saveliev A., Malov D. Managing audio and video streams in peer-to-peer videoconferencing applications. Proceedings of the 10th Multi-Conference MCU-2017, vol. 3, 2017, pp. 94-96.

Other publications

26. Tampel I., Karpov A. Automatic speech recognition. Tutorial - Spb: University of ITMO, 2017, 152 p.
27. Verkholyak O., Karpov A. Combining utterance-level and frame-level feature representations for emotion classification from speech. In IEEE International Symposium "Video and Audio Signal Processing in the Context of Neurotechnologies", SPCN-2017, 2017, pp. 31.
28. Syrkin L., Zuykova A., Karpov A., Usov V. Application of an alternative method of communication for everyday interaction of a person with reduced physical capacity and a robot assistant. Proceedings of the Conference "Cognitive Research at the Present Stage" KISE-2017, Kazan, 2017.
29. Velichko A., Sokolov B., Karpov A., Budkov V. A brief review of the methods used in paralinguistic analysis of speech. Collection of reports of the 70th international student scientific conference GUAP. Part 2. Technical Sciences, St. Petersburg: GUAP, 2017, pp. 51-53.
30. Saveliev A. Development of a configuration method for the optimal arrangement of heterogeneous modules of the IoT network. Materials of the XXII St. Petersburg Assembly of Young Scientists and Specialists, 2017, pp. 143.
31. Kipyatkova I. Development and research of neural network hybrid acoustic models for the Russian speech recognition system. Materials of the XXII St. Petersburg Assembly of Young Scientists and Specialists, 2017, pp. 201.

Laboratory of Computer Security Problems

Head of Laboratory: Dr.Tech. Sci., Professor Igor V. Kotenko – information security, including security policy management, access control, authentication, network security analysis, intrusion detection, firewalls, deception systems, malware protection, analysis of security protocols and systems, software protection against hacking and digital right management, modeling, simulation and visualization technologies for counteraction to cyber terrorism; artificial intelligence, including multi-agent frameworks and systems, agent-based modeling and simulation, soft and evolutionary computing, machine learning, data mining, data and information fusion; telecommunications, including decision making and planning for telecommunication systems; big data; cyber-physical systems. ivkote@comsec.spb.ru, ivkote@mail.iias.spb.su, http://comsec.spb.ru/kotenko.

Laboratory Stuff – 15 research fellows and 6 post-graduate students.

Research Activities

Information security, including security information and event management systems, security policy management, access control, authentication, network security analysis, intrusion detection, firewalls, deception systems, malware protection, analysis and verification of security protocols and systems, software protection against hacking and digital right management, modeling, simulation and visualization technologies for counteraction to cyber terrorism, intellectualization of services for protection of critical infrastructures, modeling and attacks impact analysis on cyber-physical systems.

Artificial intelligence, including multi-agent systems, soft and evolutionary computing, machine learning, data mining, data and information fusion, intellectual decision support systems, processing of incomplete and contradictory information.

Telecommunication systems and Internet of things, including decision making and planning for telecommunication systems, analysis and synthesis of protected multiservice networks. Modeling of the processes of the industrial systems of the Internet of things in the application to the cyber security systems, energy and water supply systems, railway transport systems, mobile self-organizing networks systems, etc.

Geographical information systems (GIS), including the development of methods and models of applying the GIS for solving applied problems, access control in GIS.

Research Fellows

Leading researcher Dr.Tech. Sci. Professor Igor B. Saenko – computer-based systems, information security, data processing and communications, modeling theory and mathematical statistics, information theory. ibsaen@comsec.spb.ru, http://comsec.spb.ru/saenko.

Leading researcher Dr. Tech. Sci., Professor Igor B. Parashchuk – computer network security, automated information systems, data storage and processing, control theory, simulation theory and mathematical statistics, information theory, methods for quality and effectiveness analyzing of network information security systems, parashchuk@comsec.spb.ru, http://comsec.spb.ru/ru/staff/parashchuk.

Leading researcher Cand. Tech. Sci. Andrey A. Chechulin – computer network security, intrusion detection, virus, security analysis, network worm protection, programming. chechulin@iias.spb.su, http://comsec.spb.ru/chechulin/.

Senior researcher Cand. Tech. Sci. Vasiliy A. Desnitsky – computer network security, anti-tamper techniques, security policies, Internet of Things, modeling and analysis of computer attacks. desnitsky@comsec.spb.ru, http://comsec.spb.ru/desnitsky/.

Senior researer Cand. Tech. Sci. Evgenia S. Novikova – computer network security, cryptography, authentication, visualization of security information, programming. novikova@comsec.spb.ru, http://comsec.spb.ru/novikova/ novikova@comsec.spb.ru, http://comsec.spb.ru/novikova.

Researcher Cand. Tech. Sci. Elena V. Doynikova – computer network security, in-formation security risk analysis methods, risk management. doyniko-va@comsec.spb.ru, http://comsec.spb.ru/doynikova/.

Junior researcher Alexander A. Branitsky – computer network security, intrusion detection systems, neural networks, immune system and interpolation polynomials. branits-kiy@comsec.spb.ru, http://comsec.spb.ru/branitskiy/.

Junior researcher, post-graduate student - Andrey V. Fedorchenko – com-puter network security, methods of correlation of security events, vul-nerability analysis of computer networks. fedorchenko@comsec.spb.ru, http://comsec.spb.ru/fedorchenko/.

Junior researcher, post-graduate student Maxim V. Kolomeec - distributed system security, security visualisation, kolomeec@comsec.spb.ru, http://comsec.spb.ru/kolomeec/.

Junior researcher, post-graduate student Dmitry S. Levshun - distributed system security, embedded devices, event correlation, levshun@comsec.spb.ru, http://comsec.spb.ru/levshun/.

Junior researcher, post-graduate student - Alexei G. Kushnerevich - big data, data analysis, kushnerevich@comsec.spb.ru, http://comsec.spb.ru/kushnerevich/.

Post-graduate student Nickolay A. Komashinsky – computer network security, intrusion detection, malware. komashinsky@comsec.spb.ru, http://www.comsec.spb.ru/komashinsky/

Post-graduate student Eugene S. Merkushev– security in cloud computing. merkushev@comsec.spb.ru, http://comsec.spb.ru/merkushev/

Post-graduate student Anton A. Pronoza – computer network security, big data, visualization techniques. pronoza@comsec.spb.ru, http://www.comsec.spb.ru/pronoza/.

Grants and Projects

Igor V. Kotenko (Principal Investigator). Grant of the Russian Science Foundation No.15-11-30029 "Incident management and counteraction against targeted cyber-physical attacks in distributed large-scale mission critical systems taking into account cloud services and networks of the Internet of Things", 2015-2017. (Principal Investigator).

Igor V.Kotenko (Principal Investigator from SPIIRAS). "Educating the Next generation experts in Cyber Security: the new EU-recognized Master's program". Research Project of the European Community program TEMPUS No. 544455-TEMPUS-1-2013-1-SE-TEMPUS-JPCR (http://engensec.eu/), 2014-2016.

Elena V. Doynikova (Principal Investigator) - "Development of mod-els, techniques and alghoritms for automated countermeasures gener-ation in process of security information and events management". Re-search Grant No.16-37-00338-mol_a of the Russian Foundation for Basic Research, 2016-2017.

Andrey A. Chechulin (Principal Investigator) - "Development of ma-thematical models, techniques and alghoritms of security evaluation, attack modelling and countermeasures selection in near-real time mode". Research Grant No.15-07-07451-a of the Russian Foundation for Basic Research, 2015-2017.

Andrey A. Chechulin (Principal Investigator). President's of Russian Federation Grant № МК-314.2017.9 "Methods, models and algorithms for the construction and usage of a hybrid data warehouse for analytical processing of the information and security events", 2017-2018.

Conferences

The 5th International Conference on Science & Engineering in Mathematics, Chemistry and Physics 2017 (ScieTech 2017). January 21-22, 2017, Bali, Indonesia – Igor Kotenko – one invited plenary talk and one sectional talk.

VI International scientific-technical and scientific-methodical conference "Actual problems of information telecommunications in science and education" (APITE-2017). March 01-02, 2017, St. Petersburg, Russia – Vasily Desnitsky, Andrey Chechulin, Igor Saenko, Andrey Fedorchenko – eight sectional talks.

25th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2017). March 6-8, 2017, St. Petersburg, Russia – Elena Doynikova, Igor Saenko – two sectional talks.

XIX scientific and practical conference "RusCrypto'2017". March 22-24, 2017, Solnechnogorsk, Moscow Region, Russia – Igor Kotenko, Andrey Chechulin, Alexei Kushnerevich – tree sectional talks.

20th Conference of Open Innovations Association FRUCT. April 3-7, 2017, St.Petersburg, Russia – Elena Doynikova, sectional talk.

International Conference Positive Hack Days VII (PHD7), Moscow, Russia, May 23-24, 2017 – Igor Kotenko, Vasily Desnitsky, Andrey Chechulin, Andrey Fedorchenko, two sectional talks.

XX International Conference on Soft Computing and Measurements (SCM'2017). May 24-26, 2017, St. Petersburg, Russia – Vasily Desnitsky, Elena Doynikova, two sectional talks.

Digital Transformation and Global Society. Second International Conference, DTGS 2017. June 21–23, 2017, St. Petersburg, Russia – Andrey Chechulin, sectional talk.

The Fourth ACM Workshop on Genetic and Evolutionary Computation in Defense, Security, and Risk Management (SecDef'2017). In conjunction with the ACM Genetic and Evolutionary Computation Conference (GECCO). GECCO '17 Companion. July 15-19, 2017, Berlin, Germany – Igor Kotenko, sectional talk.

The 14th IEEE Conference on Advanced and Trusted Computing (ATC 2017). August 4-8, 2017, San Francisco, USA – Igor Kotenko.

The 2017 7th International Conference on Mathematical Methods, Models and Architectures for Computer Networks Security (MMM-ACNS-2017). August 28-30, 2017, Warsaw, Poland – Igor Kotenko, Andrey Chechulin, two sectional talks.

Congress on Intelligent Systems and Information Technologies "IS & IT'17". September 2-9, 2017, vill. Divnomorskoe, Krasnodar region, Russia – Elena Doynikova, Andrey Chechulin, Vasily Desnitsky, Igor Kotenko – three sectional talks.

2nd International Scientific Conference "Intelligent information technologies for industry" (IITI'17). September 14-16, 2017, Varna, Bulgaria – Igor Kotenko, Andrey Chechulin, two sectional talks.

III Interregional scientific-practical conference "Perspective directions of development of native information technologies". September 19-23, 2017, Sevastopol, Russia – Igor Parashchuk – sectional talk.

The 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS'2017). 21-23 September, 2017, Bucharest, Romania – Igor Kotenko, Andrey Chechulin, two sectional talks.

The Sixth International Conference on Communications, Computation, Networks and Technologies (INNOV 2017). October 8-12, 2017. Athens, Greece – Igor V. Kotenko – one sectional talk.

11th International Symposium on Intelligent Distributed Computing - IDC'2017. 11-13 October 2017, Belgrade, Serbia – Vasily Desnitsky, Igor Kotenko, two sectional talks.

The 10th International Symposium on Foundations & Practice of Security (FPS 2017). October 23-25, 2017, Nancy, France – Igor Kotenko, sectional talk.

Anniversary X St. Petersburg Interregional Conference "Information Security of Russian Regions (ISRR-2017)" November 1-3, 2017, St. Petersburg, Russia – Igor V. Kotenko – one plenary talk, Igor Saenko, Igor Parashchuk, Andrey Chechulin, Vasily Desnitsky, Andrey Fedorchenko, Elena Doynikova, Alexander Branitskiy, Maxim Kolomeec, Dmitry Levshun, Alexei Kushnerevich, etc. – 18 sectional talks.

All-Russian forum "System of distributed situational centers as a basis for digital transformation of public administration". October 25-27, 2017, St. Petersburg, Russia – Igor Kotenko, Igor Saenko, Igor Parashchuk, Andrey Chechulin, Vasily Desnitsky, Andrey Fedorchenko, Elena Doynikova, Alexander Branitskiy, Maxim Kolomeec, Dmitry Levshun, Alexei Kushnerevich, etc. – 19 sectional talks.

Scientific and Practical Conference "Monitoring of Information Security – Problems of Construction and Operation". November 21, 2017, Moscow, Russia – Igor Kotenko – one plenary talk.

Third International School of Young Scientists "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems", (IM&CTCPA 2017). December 18-21, 2017 St. Petersburg, Russia – gor Kotenko, Igor Saenko, Maxim Kolomeec, Dmitry Levshun – 4 plenary talks.

Research Management

25th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2017). http://pdp2017.org. Saint-Petersburg, Russia, March 6-8, 2017. I. Kotenko is the organizer and Chairman of the Program Committee. 110 participants.

Special session “Security in parallel, distributed and network-based systems” (SPDNS 2017). PDP 2017. Saint-Petersburg, Russia, March 6-8, 2017. http://www.comsec.spb.ru/spdns17/. I. Kotenko is the organizer and Chairman of the Program Committee. 110 participants.

The section “Perspective research in the field of cybersecurity” at the International Conference “RusCrypto 2017”. Solnechnogorsk, Russia. March 21-24, 2017. http://www.ruscrypto.ru/accotiation/archive/rc2017/. I. Kotenko is the the section organizer and moderator. 20 participants.

III International Scientific School “Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems” (IM&CTCPA 2017), St. Petersburg, December 18–21, 2017. http://www.comsec.spb.ru/imctcpa17/ I. Kotenko – the organizer and

Chairman of the School, I. Saenko, A. Chechulin, V. Desnitsky – members of the Organizing Committee. 150 participants.

International Cooperation

International Cooperation with the following organizations: Council of National Research (CNR) of Italy (Consiglio Nazionale delle Ricerche) (Italy), University of Torino (Politecnico di Torino) (Italy), University of Murcia (Universidad de Murcia) (Spain), University of Trento (Universita di Trento) (Italy), Fraunhofer Institute for Secure Information Technology (Fraunhofer-Institut für Sichere Informations-Technologie in Darmstadt) (Germany), Blekinge Institute of Technology (BTH) (Karlskrona, Sweden), Wroclav University of Technology (WTU) (Wroclaw, Poland), University of Latvia (UOL) (Riga, Latvia), The German Federal Criminal Police Office (BKA) (Wiesbaden, Germany), CONSORZIO INTERUNIVERSITARIO NAZIONALE PER L'INFORMATICA (Italy), FUNDACAO DA FACULDADE DE CIENCIAS DA UNIVERSIDADE DE LISBOA (Portugal), Institut Telecom (France), UNIVERSIDAD POLITECNICA DE MADRID (Spain), LINKOPINGS UNIVERSITET (Sweden), UNIVERSIDAD DE MALAGA (Spain), QUEENSLAND UNIVERSITY OF TECHNOLOGY - QLD QUT (Australia), Kharkiv National University of Radio Electronics (KhNURE) (Kharkov, Ukraine), State University of Telecommunications (SUT) (Kiev, Ukraine), Lviv Polytechnic National University (LPU) (Lviv, Ukraine), Ukrainian Information Security Group (NGO UISG) (Kiev, Ukraine), AIESEC Ukraine (Kiev, Ukraine), Kharkiv state center for information security (KhRCIP) (Kharkov, Ukraine), Scientific production association “Radio and Telecom Systems” (RTS) (Kharkov, Ukraine), Ministry of Education and Science, Youth and Sports of Ukraine (MON) (Kiev, Ukraine), F-Secure (Helsinki, Finland), ATOS ORIGIN SOCIEDAD ANONIMA ESPANOLA (Spain), EPSILON S.R.L (Italy), FRANCE TELECOM SA (France), Open Source Security Information Management, S.L. (Spain), T-SYSTEMS SOUTH AFRICA (PTY) LTD (South Africa), 6CU RE SAS (France), ASCOM (SCHWEIZ) AG (Switzerland), INFINEON TECHNOLOGIES AG (Germany), SEARCH-LAB SECURITY EVALUATION ANALYSIS AND RESEARCH LABORATORY, LTD (Hungary), MIXED MODE GMBH (Germany), TELEFONICA INVESTIGACION Y DESARROLLO SA (Spain), Paul Sabatier University, Toulouse III (France), etc..

Membership in Domestic and International Societies, Editorial Boards

I. Kotenko – Member of Russian and European Associations of Artificial Intelligence, IEEE and Computer Society, Association for Computing Machinery (ACM), Institute for Systems and Technologies of Information, Control and Communication (INSTICC), the Series Editor of Springer’s

Communications in Computer and information Science; member of board of directors of International scientific, engineering and educational organization dedicated to advancing the arts, sciences and applications of Information Technology and Microelectronics (Euromicro);); the member of editorial board of scientific journals: “Problems of Informatics”, “Vestnik RGUPS”, "International Journal of Computing", "The Open Bioinformatics Journal", "The Open Automation and Control Systems Journal", “The FTRA Journal of Convergence”, “International Journal of u- and e- Service, Science and Technology”; the reviewer of the scientific journals: “Information technologies and computer systems”, "ACM Transactions on Internet Technology", "ACM Transactions on Multimedia Computing, Communications, and Applications", “IEEE Software”, “IEEE Access”, “IEEE Computer”, “IEEE Transactions on Dependable and Secure Computing”, “Security and Communication Networks”, “Transactions on Systems, Man, and Cybernetics”, “Computer Standards & Interfaces”, “Recent Patents on Computer Science”, “The International Journal for the Computer and Telecommunications Industry”, “Data Mining and Knowledge Discovery”, “International Journal of Computer Science Applications”, “Informatica”, “Security and Communication Networks”, “Telecommunication Systems Journal”, "Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications", etc., chair of the program committees of International conferences "Mathematical Methods, Models and Architectures of Computer Network Security Systems" (MMM-ACNS-2017), European (Euromicro) International Conference on Parallel, Distributed and Network-Based Processing (PDP 2017); Special session “Security in parallel, distributed and network-based systems” (SPDNS 2017) IEEE International Conference on Advanced and Trusted Computing (ATC 2017), the International scientific school "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems" (IM&CTCPA 2017). Member of the program committees of 28 International conferences and seminars.

I. Saenko – Corresponding Member of Russian Academy of Natural Sciences, Section of Geopolitics and Security; Member of Arctic Academy of Sciences, Section of Information Technologies; member of program committee of Special session “Security in parallel, distributed and network-based systems” (SPDNS 2017) of European (Euromicro) International Conference on Parallel, Distributed and Network-Based Processing (PDP 2017); member of program committee of Third International School of Young Scientists "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems", (IM&CTCPA 2017).

Vasily Desnitsky – member of program committee of European (Euromicro) International Conference on Parallel, Distributed and

Network-Based Processing (PDP 2017); member of program committee of Third International School of Young Scientists "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems", (IM&CTCPA 2017); reviewer of "Trudy of SPIIRAS" journal. Reviewer of international conferences EDAS 2018, PDP 2018, ICUMT 2017, IDC 2017, etc.

Andrey Chechulin – member of program committee of Special session “Security in parallel, distributed and network-based systems” (SPDNS 2017) of European (Euromicro) International Conference on Parallel, Distributed and Network-Based Processing (PDP 2017); member of program committee of Third International School of Young Scientists "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems", (IM&CTCPA 2017); reviewer of "Trudy of SPIIRAS" journal. reviewer of "Trudy of SPIIRAS" journal. Reviewer of international conferences EDAS 2018, PDP 2018, ICUMT 2017, IDC 2017, etc.

Elena Doynikova – member of program committee of Third International School of Young Scientists "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems", (IM&CTCPA 2017); reviewer of Journal of Information Security and Applications; reviewer of Journal of Ambient Intelligence and Humanized Computing.

Intellectual Property Registered in the Reporting Year

Programs and databases

Elena Doynikova, Igor Kotenko, Igor Saenko. Subsystem for countermeasures automatic selection in computer networks based on graph models in static and dynamic modes of operation. Federal Service for Intellectual Property. Certificate No. 2017619725. Registered in the Computer Program Registry 01.09.2017.

Vasily Desnitsky, Igor Parashchuk, Andrey Chechulin. Modeling of the attacks on wireless modules if mobile network. Federal Service for Intellectual Property. Certificate No. 2017619724. Registered in the Computer Program Registry 19.09.2017.

Mikhail Bulgakov, Andrey Chechulin, Igor Kotenko. Component for data extraction from control channels of railway model. Federal Service for Intellectual Property. Certificate No. 2017660182. Registered in the Computer Program Registry 19.09.2017.

Vasily Desnitsky, Igor Kotenko, Andrey Chechulin. Processing of security events from the cyberphysical water supply management system. Federal Service for Intellectual Property. Certificate No. 2017660183. Registered in the Computer Program Registry 19.09.2017.

Alexander Branitskiy, Igor Kotenko, Igor Saenko. Frontend-interface of network attack generator. Federal Service for Intellectual

Property. Certificate No. 2017660184. Registered in the Computer Program Registry 19.09.2017.

Maxim Kolomeec, Andrey Chechulin, Igor Kotenko. Visual interface for Smart home security system management. Federal Service for Intellectual Property. Certificate No. 2017661653. Registered in the Computer Program Registry 17.10.2017.

Andrey Fedorchenko, Igor Kotenko, Igor Saenko. Agent for Windows security events collection with a function of selective anonymization of transmitted information. Federal Service for Intellectual Property. Certificate No. 2017619728. Registered in the Computer Program Registry 01.09.2017.

Dmitry Levshun, Igor Kotenko, Andrey Chechulin. Repository for heterogeneous data from the hardware elements of the smart home. Federal Service for Intellectual Property. Certificate No. 2017620996. Registered in the database Registry 01.09.2017.

Vasily Desnitsky, Igor Kotenko, Igor Parashchuk. Managing of the security of a wireless mesh-network. Federal Service for Intellectual Property. Certificate No. 2017661289. Registered in the Computer Program Registry 09.10.2017.

Elena Doynikova, Andrey Chechulin, Andrey Fedorchenko. Component for data normalization from external sources for building a hybrid security repository. Federal Service for Intellectual Property. Certificate No. 2017663405. Registered in the Computer Program Registry 01.12.2017.

Andrey Fedorchenko, Andrey Chechulin, Elena Doynikova. Component for analysis of semi-structured databases for building a hybrid security repository. Federal Service for Intellectual Property. Certificate No. 2017663404. Registered in the Computer Program Registry 01.12.2017.

Igor Saenko, Alexei Kushnerevich, Igor Kotenko. A software testbed for evaluating processing performance of large arrays of heterogeneous traffic data in a computer network. Certificate No. 2017662455. Registered in the Computer Program Registry 08.11.2017.

Expertise

I. Kotenko – member of commission of experts of the Russian Foundation for Basic Research, expert of the Foundation for Advanced Research, expert of the Russian Science Foundation, expert of the Russian Academy of Sciences and expert of the Federal Service for Supervision in the Sphere of Education and Science.

I. Saenko – member of the Higher Attestation Commission, expert of the Federal Service for Supervision in the Sphere of Education and Science.

A. Chechulin – expert of the Russian Science Foundation, advisory board member in European Union research project Cybersecurity

Awareness and Knowledge Systemic High-level Application (YAKSHA), Nr. 780498, 2018-2020.

Recent Results

1. Models, methods and algorithms for correlation of security events based on the analysis of event structures [15, 42, 44, 71, 81].
2. Model and technique for assessing the cyber-resistance of computer networks based on the simulation of cyber attacks by the method of converting the stochastic networks [27, 30, 47, 96].
3. Models, methods, algorithms and prototypes of information security risk management for secure multiservice networks based on fuzzy logic inference [21, 69, 97].
4. Methods, models and algorithms for assessing the security of computer networks [2, 7, 11, 29, 40, 42, 56, 64].
5. Methods, models and algorithms of decision support for the selection of countermeasures in computer networks, including through the use of new indices for the choice of countermeasures [6, 7, 11, 13, 28, 40, 64, 85].
6. Methods, models, techniques and algorithms for visualization of computer security metrics [13, 66, 67, 87].
7. Models and algorithms for analyzing security incidents in wireless mobile networks [17, 19, 31, 48, 55, 58, 76, 99].
8. Models and techniques for modeling and assessing the energy resource exhaustion attacks of cyberphysical devices [16, 76, 99].
9. Approaches and methods of visualization of cyber-security data in virtual and augmented reality [39, 66, 87].
10. Methods, models, techniques and algorithms for processing big data, evaluating and comparing the efficiency of usage of distributed computing platforms Hadoop, Spark and Elastic Stack for the purpose of providing network security [3, 10, 23, 25, 36, 45, 68, 72, 73, 80, 94].
11. Methods for the ontological representation of a hybrid security storage for evaluating security and selecting countermeasures [18, 20, 32, 86, 93].
12. Methods for the integrated design of secure systems based on embedded devices [16, 38, 59, 77].
13. Technique of hierarchical hybridization of adaptive binary classifiers for detecting the anomalous network connections [24, 12].
14. Model and algorithm of functioning the evolutionary immune system with application to detection and classification of network attacks [1].

Awards and Scholarships

Kotenko I.V., Saenko I.B., Ageev S.A. – the best paper award at the Seventh International Conference on Communications, Computation, Networks and Technologies (INNOV 2017). Athens, Greece. October 8-12, 2017 (https://www.iaria.org/conferences2017/AwardsINNOV17.html).

Chechulin A.A. – the second place in the competition "Automotive Village: CarPWN" on the conference Positive Hack Days VII (http://phdays.ru).

Chechulin A.A. – winner of the contest for the right to receive grants from the President of the Russian Federation for state support of young Russian scientists – candidates of science in the field of knowledge "Information and Telecommunication Systems and Technologies". Certificate No. МК-314.2017.9.

Chechulin A.A., Novikova E.S. – winners of the competitive selection for subsidies to young scientists, young candidates of science of higher educational institutions and academic institutes located on the territory of St. Petersburg in 2016.

Fedorchenko A.V. – Scholarship of the Government of the Russian Federation, dec. FAO of Russia No. 130 of March 20, 2017, 2017-2018.

Fedorchenko A.V., Chechulin A.A., Doynikova E.V., Branitskiy A.A., Levshun D.S. – winners of the competition for the best scientific work (set of scientific articles) of SPIIRAS.

References

Papers published in journals indexed in WoS, Scopus

1. Branitskiy A., Kotenko I. Hybridization of computational intelligence methods for attack detection in computer networks. Journal of Computational Science, Elsevier, 2017, No.23, P.145–156.
2. Doynikova E., Kotenko I. CVSS-based Probabilistic Risk Assessment for Cyber Situational Awareness and Countermeasure Selection. Proceedings of the 25th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2017). St. Petersburg, Russia, March 6-8, 2017. Los Alamitos, California. IEEE Computer Society. 2017. P.346-353.
3. Saenko I., Kotenko I., Kushnerevich A. Parallel Processing of Big Heterogenious Data for Security Monitoring of IoT Networks. Proceedings of the 25th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2017). St. Petersburg, Russia, March 6-8, 2017. Los Alamitos, California. IEEE Computer Society. 2017. P.329-336.
4. Kotenko I., Chechulin A., Branitskiy A. Generation of Source Data for Experiments with Network Attack Detection Software. Journal of Physics: Conference Series, IOP Publishing. Vol.820, 2017. http://iopscience.iop.org/article/10.1088/1742-6596/820/1/012033/pdf
5. Kotenko I., Chechulin A., Komashinsky D. Categorisation of web pages for protection against inappropriate content in the internet. International Journal of Internet Protocol Technology, 2017, Vol.10, No.1, pp.61-71. DOI: 10.1504/IJIPT.2017.10003851.
6. Kotenko I., Doynikova E. Selection of countermeasures against network attacks based on dynamical calculation of security met-

rics. Journal of Defence Modeling and Simulation, 2017. P.1-23. https://doi.org/10.1177/1548512917690278.
7. Doynikova E., Chechulin A., Kotenko I. Analytical Attack Modeling and Security Assessment based on the Common Vulnerability Scoring System. Proceedings of the 20th Conference of Open Innovations Association FRUCT, LETI University, St.Petersburg, Russia. ISSN 2305-7254, ISBN 978-952-68653-0-0, FRUCT Oy, e-ISSN 2343-0737. IEEE Xplore, 2017. P.53-61.
8. Kotenko I., Saenko I., Chechulin A. Protection against information in eSociety: using Data Mining methods to counteract unwanted and malicious data. Digital Transformation and Global Society. Second International Conference, DTGS 2017. St. Petersburg, Russia, June 21–23, 2017. Revised Selected Papers. Communications in Computer and Information Science (CCIS), Vol.745. 2017. P.170-184. https://doi.org/10.1007/978-3-319-69784-0_15.
9. Saenko I., Kotenko I. Administrating Role-Based Access Control by Genetic Algorithms. The Fourth ACM Workshop on Genetic and Evolutionary Computation in Defense, Security, and Risk Management (SecDef'2017). In conjunction with the ACM Genetic and Evolutionary Computation Conference (GECCO). GECCO '17 Companion, July 15-19, 2017, Berlin, Germany. 2017 Association for Computing Machinery. P.1463-1470. http://dx.doi.org/10.1145/3067695.3082509.
10. Kotenko I., Kuleshov A., Ushakov I. Aggregation of Elastic Stack Instruments for Collecting, Storing and Processing of Security Information and Events. The 14th IEEE Conference on Advanced and Trusted Computing (ATC 2017). San Francisco, August 4-8, 2017, USA. Los Alamitos, California. IEEE Computer Society. 2017. P.1550-1557.
11. Doynikova E., Kotenko I. Enhancement of Probabilistic Attack Graphs for Accurate Cyber Security Monitoring. The 14th IEEE Conference on Advanced and Trusted Computing (ATC 2017). San Francisco, August 4-8, 2017, USA. Los Alamitos, California. IEEE Computer Society. 2017. P. 1492-1497.
12. Branitskiy A., Kotenko I. Network anomaly detection based on an ensemble of adaptive binary classifiers. Computer Network Security. Lecture Notes in Computer Science, Springer-Verlag, Vol.10446. The 2017 7th International Conference on Mathematical Methods, Models and Architectures for Computer Networks Security (MMM-ACNS-2017). August 28-30, 2017, Warsaw, Poland. P.143–157. DOI: 10.1007/978-3-319-65127-9_12.
13. Kolomeec M., Gonzalez-Granadillo G., Doynikova E., Chechulin A., Igor Kotenko, Debar H. Choosing models for security metrics visualization. Computer Network Security. Lecture Notes in Computer Sci-

ence, Springer-Verlag, Vol.10446. The 2017 7th International Conference on Mathematical Methods, Models and Architectures for Computer Networks Security (MMM-ACNS-2017). August 28-30, 2017, Warsaw, Poland. P.75–87.
14. Novikova E, Murenin I. Visualization-Driven Approach to Anomaly Detection in the Movement of Critical Infrastructure. Computer Network Security. Lecture Notes in Computer Science, Springer-Verlag, Vol.10446. The 2017 7th International Conference on Mathematical Methods, Models and Architectures for Computer Networks Security (MMM-ACNS-2017). August 28-30, 2017, Warsaw, Poland. P.50–61. DOI: 10.1007/978-3-319-65127-9_5.
15. Fedorchenko A., Kotenko I. El Baz D. Correlation of security events based on the analysis of structures of event types. The 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS'2017). 21-23 September, 2017, Bucharest, Romania. P.270-276.
16. Levshun D., Chechulin A., Kotenko I. Design Lifecycle for Secure Cyber-Physical Systems based on Embedded Devices. The 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS'2017). 21-23 September, 2017, Bucharest, Romania. P.277-282.
17. Desnitsky V., Kotenko I. Modeling and Analysis of Energy Resource Exhaustion Attacks in IoT. Intelligent Distributed Computing XI. Studies in Computational Intelligence. Springer-Verlag, Vol.737. Proceedings of 11th International Symposium on Intelligent Distributed Computing - IDC'2017. Belgrade, Serbia. 11-13 October 2017, 2017. Springer-Verlag. 2017. P.263-270.
18. Kotenko I., Chechulin A., Doynikova E., Fedorchenko A. Ontological Hybrid Storage for Security Data. Intelligent Distributed Computing XI. Studies in Computational Intelligence. Springer-Verlag, Vol.737. Proceedings of 11th International Symposium on Intelligent Distributed Computing - IDC'2017. Belgrade, Serbia. 11-13 October 2017, 2017. Springer-Verlag. 2017. P.159-171.
19. Desnitsky V., Kotenko I. Modeling and analysis of security incidents for mobile communication mesh ZigBee-based network. XX International Conference on Soft Computing and Measurements (SCM'2017). IEEE Xplore, 2017. P.500-502.
20. Fedorchenko A., Kotenko I., Doynikova E., Chechulin A. The ontological approach application for construction of the hybrid security repository. XX International Conference on Soft Computing and Measurements (SCM'2017). 2017. P.525-528.
21. Kotenko I., Saenko I., Ageev S. Fuzzy Adaptive Routing in Multi-Service Computer Networks under Cyber Attack Implementation. 2nd

International Scientific Conference “Intelligent information technologies for industry” (IITI’17), September 14-16, 2017, Varna, Bulgaria. Advances in Intelligent Systems and Computing, Volume 679, Springer, 2017. Volume 1, P.215-225.
22. Kotenko I., Chechulin A., Bulgakov M. Intelligent Security Analysis of Railway Transport Infrastructure Components on the base of Analytical Modeling. 2nd International Scientific Conference “Intelligent information technologies for industry” (IITI’17), September 14-16, 2017, Varna, Bulgaria. Advances in Intelligent Systems and Computing, Springer, Volume 680, 2017. Vol. 2, P.178-188.
23. Kotenko I., Saenko I., Kushnerevich A. Parallel big data processing system for security monitoring in Internet of Things networks. Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), Vol.8, No.4
24. Branitskiy A. Hierarchical Hybridization of Binary Classifiers for Detecting the Anoma-lous Network Connections. SPIIRAS Proceedings. No. 3 (52), 2017. P. 204–233. (in Russ.).
25. Kotenko I., Kuleshov A., Ushakov I. A System for Collecting, Storing and Processing Security Information and Events based on Elastic Stack Tools. SPIIRAS Proceedings. No. 5 (54), 2017. P. 5-34.
26. Novikova E., Murenin I. The Technique of the Visual Analysis of the Organization Employees Routes for Anomaly Detection. SPIIRAS Proceedings. No. 5 (54), 2017. P. 57-83. (in Russ.).
27. Kotenko I., Saenko I., Kotsynyak M., Lauta O. Assessment of Cyber-Resilience of Computer Networks based on Simulation of Cyber Attacks by the Stochastic Networks Conversion Method. SPIIRAS Proceedings. No. 6 (55), 2017. P. 160-184. (in Russ.).
28. Gonzalez-Granadillo G., Doynikova E., Kotenko I., Garcia-Alfaro J. Attack Graph-based Countermeasure Selection using a Stateful Return on Investment Metric. The 10th International Symposium on Foundations & Practice of Security (FPS 2017). October 23-24-25, 2017 Nancy, France. Lecture Notes in Computer Science, Springer-Verlag, 2017. (Accepted for printing).
29. Doynikova E., Kotenko I. An automated graph based approach to risk assessment for computer networks with mobile components. Mobile Internet Security. Communications in Computer and Information Science, V.797, Springer, 2017. (Accepted for printing).
30. Kotenko I., Saenko I., Lauta O., Kocinyak M. Assessment of computer network resilience under impact of cyber attacks on the basis of stochastic networks conversion. Mobile Internet Security. Communications in Computer and Information Science, V.797, Springer, 2017. (Accepted for printing).

Papers published in national journals indexed in the RISC

31. Desnitsky V., Kotenko I. Modeling and analysis of security incidents in a mobile communication self-organized network on the

base of ZigBee protocol. XX International Conference on Soft Computing and Measurements (SCM'2017),Proceedings. Vol. 2, Saint-Petersburg, ETU "LETI", 2017. P. 39-42. (in Russ.).
32. Fedorchenko A., Kotenko I., Doynikova E., Chechulin A. The ontological approach application for the construction of the hybrid security repository. XX International Conference on Soft Computing and Measurements (SCM'2017),Proceedings. Vol. 2, Saint-Petersburg, ETU "LETI", 2017. P.55-58. (in Russ.).
33. Kotenko I.V., Saenko I.B., Chechulin A.A. Protection from unwanted and harmful information in global information networks. Information-psychological and cognitive security. Collective monograph / Ed. I. F. Kefeli, R. M. Yusupova. St. Petersburg.: Publishing house "Aurora" 2017. 345 p. - C.207-229. (in Russ.).
34. Branitskiy A., Kotenko I. Open Source Software for Network Attack Detection and Prevention. Part 1. Information security. Inside. No. 2, 2017. P. 40-47. (in Russ.).
35. Branitskiy A., Kotenko I. Open Source Software for Network Attack Detection and Prevention. Part 2. Information security. Inside. No. 3, 2017. P. 58-66. (in Russ.).
36. Kotenko I., Ushakov I. Big Data Technologies for Monitoring of Computer Security. Information security. Inside. No. 3, 2017. P. 23-33. (in Russ.).
37. Kotenko I., Desnitsky V. Countering Targeted Cyber-Physical Attacks in Distributed Large-Scale Critical Systems. Information Security. Inside, №4(76), 2017. P. 66-69. (in Russ.).
38. Levshun D., Chechulin A., Kotenko I. Design Lifecycle for Secure Cyber-Physical Systems Based on Embedded Devices. Information Security. Inside, №4(76), 2017. P.53-59. (in Russ.).
39. Kolomeec M., Kotenko I., Chechulin A. Using virtual and augmented reality for cyber security data visualization. Information Security. Inside, №5(77), 2017. P.58-63. (in Russ.).
40. Doynikova E., Kotenko I. Multi-layer technique of proactive cyber-attack response based on graph models. Information Security. Inside, 2017, No. 6. pp. 58-67. (in Russ.).
41. Kotenko I., Chechulin A., Levshun D. Security Analysis of Railway Transport Infrastructure on the Base of Analytical Modeling. Information Security. Inside, №6(78), 2017. P.48-57. (in Russ.).
42. Doynikova E., Chechulin A. Kotenko I. Computer networks security evaluation based on CVSS metrics. Information and Control Systems, 2017, No. 6. pp. 66-77. (in Russ.).
43. Kotenko I., Parashchuk I. To the issue of the complex security of the "Smart City" and the problems of counteraction to socio-cyberphysical threats. WORLD SCIENCE: PROBLEMS AND INNOVATIONS. Proceedings of XII international science-practical conference. Penza, 2017. P. 33-36. (in Russ.).

44. Kotenko I., Fedorchenko A., Saenko I., Kushnerevich A. Big-data technologies for security event correlation based on types relations. Cybersecurity issues. 2017. No.5(23). (in Russ.).
45. Vasilishin N., Dubrovin N., Ushakov I., Chechulin A. Methods of gathering and analysis of network traffic on Big Data technology. VI International Conference on Advanced Info-Telecommunication (ICAIT 2017). 01-02 March 2016. Conference proceedings. St. Petersburg., 2017. Vol. 2. P. 127-131. (in Russ.).
46. Vikhrov M., Fedorchenko A., Chechulin A. Formats of rules description for security event correlation on cyber-physical systems. VI International Conference on Advanced Info-Telecommunication (ICAIT 2017). March 1-2, 2017. Proceedings. Vol. 2 pp.175-179. (in Russ.).
47. Desnitsky V., Desnitsky V.A., Kotenko I.V., Lauta O.S., Sayenko I.B. Approach to the assessment of cyberstability based on the topological transformation of stochastic networks. VI International Conference on Advanced Info-Telecommunication (ICAIT 2017). 01-02 March 2016. Conference proceedings. St. Petersburg., 2017. Vol. 2. P.250-255. (in Russ.).
48. Desnitsky V., Ostrouschenko N. The model of a secure mobile communications network and operational management in emergency situations. VI International Conference on Advanced Info-Telecommunication (ICAIT 2017). 01-02 March 2016. Conference proceedings. St. Petersburg., 2017. Vol. 2. P. 255-260. (in Russ.).
49. Fedorchenko A., Doynikova E., Chechulin A. Analysis of data source and heir formats for analytical processing systems of security information and events. VI International Conference on Advanced Info-Telecommunication (ICAIT 2017). March 1-2, 2017. Proceedings, Vol. 2. (in Russian). (Accepted for printing).
50. Saenko I., Kushnerevich A., Kotenko I., Chechulin A. The approach to creating a software system for distributed parallel processing of big datasets about security events in a computer network. VI International Conference on Advanced Info-Telecommunication (ICAIT 2017). March 1-2, 2017. Conference proceedings. Saint-Petersburg, 2017. (in Russ.).
51. Desnitsky V. An IoTaaS-based approach to design digital city software. Vestnik Sankt-Peterburgskogo Universiteta GPS MChS Rossii. 2017. Issue. 4. P. 81-92. (in Russ.).
52. Desnitsky V. A modeling and analysis of security incidents in a cyber-physical system for water supply management. Journal Information technologies and telecommunications. 2017. No. 3. P. 93-102. (in Russ.).
53. Kotenko I., Parashchuk I., Saenko I. Information Security of Cyber-physical Systems: the Main Directions of Research. Perspective directions of development of native information technologies: materi-

als of the III Interregional scientific-practical conference "Perspective directions of development of native information technologies". Sevastopol, September 19-23, 2017; scientific. Ed. B.V. Sokolov. – Sevastopol: RIBEST, 2017. 256 p. P. 63-64. (in Russ.).
54. Levshun D. Design of unified repository for multimedia data from field ethnographic expeditions. Information Technology and Telecommunications. 2017. Vol. 5. № 3. P. 84–92. (in Russian).
55. Desnitsky V. Evaluation of wireless device protection from energy exhaustion attacks. International congress IS&IT – International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 2-9, 2017. Vol. 2. pp. 343-349. (in Russ.).
56. Doynikova E., Kotenko I. Technique for the automatic assessment of secondary business assets security properties criticality in the service oriented architectures. International congress IS&IT – International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 2-9, 2017. Vol. 2. pp. 349-355. (in Russ.).
57. Chechulin A., Kotenko A.. Modeling cyber-physical attacks and producing countermeasures in a mode near to real-time. International congress IS&IT – International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 2-9, 2017. Vol. 2. pp. 271-276. (in Russ.).
58. Desnitsky V. Modeling and security analysis of a communication network for crisis managament on the base of xbee devices. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.). (Accepted for printing).
59. Levshun D. The approach to design of secure systems based on embedded devices. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russian). (Accepted for printing).
60. Parashchuk I., Zhmurov V., Sayarkin L. Types of trusted downloads and their role in providing information security of telecommunications networks. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.). (Accepted for printing).
61. Parashchuk I., Ziyaev P., Tkachenko V. Analysis of application trends and information security issues for storage systems for cloud technologies. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-

Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russian). (Accepted for printing).
62. Branitskiy A. Evasion and Insertion Network Attacks on the Example of Snort, Suricata and Bro. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017. (in Russ.). (Accepted for printing).
63. Branitskiy A. Algorithms for Parallel Searching of Template Substrings in Realization of ADS Signature Rules. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.). (Accepted for printing).
64. Doynikova E., Kotenko I. Models, technique and algorithms of the countermeasure selection based on the system of security metrics for the proactive and reactive response to attacks in computer networks. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", St. Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.). (Accepted for printing).
65. Fedorchenko A., Chechulin A., Doynikova E. Security event formats in logging system of OS Windows. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.). (Accepted for printing).
66. Kolomeec M. Data visualization models usage in DLP systems. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.). (Accepted for printing).
67. Kolomeec M., Chechulin A. Application of new visualization models to improve the effectiveness of user-made solutions. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ). (Accepted for printing).
68. Kushnerevich A.G. Effectiveness evaluation of the Hadoop distributed data analysis platform in comparison with the Spark platform for network security purposes. X St. Petersburg Interregional Conference «Information security of Russian regions» (ISRR-2017). November 1-3 2017 г. Conference proceedings. Vol. 3. Saint-Petersburg.: SPOISU, 2017 (in Russ). (Accepted for printing).
69. Ageev S.A., Sayenko I.B. Evaluation of the risks of networked computer security based on fuzzy logical inference. X St. Petersburg Interregional Conference "Information Security of Russian Regions" (IBRD-2017). 1-3 November 2017, Conference proceed-

ings. Vol. 3. Saint-Petersburg.: SPOISU, 2017 (in Russian). (Accepted for publication).
70. Saenko I. Analysis of the Problem of Access Control to Information Resources in Cloud Infrastructures. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ). (Accepted for printing).
71. Fedorchenko A., Kotenko I. Influence of data changes dynamics in the process of security events correlation. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ). (Accepted for printing).
72. Ushakov I., Kotenko I. The Model of Detection of Internal Violators based on the Usage of Big Data Technologies. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ). (Accepted for printing).
73. Ushakov I., Kotenko I. Corporate Network Security Databases: Application of SQL and NoSQL Technologies. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ). (Accepted for printing).
74. Pronoza A., Pronoza E., Chechulin A., Kotenko I. Automatic detection of differences in the interests of users of the social network, depending on their specified mental functions. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ.) (Accepted for printing).
75. Pronoza A., Chechulin A., Komashinsky N. Security threats in social networks and protection from information. X Saint-Petersburg Interregional conference "Information security of regions of Russia (IBRR-2017)", Saint-Petersburg, November 1-3, 2017. The proceedings of conference, 2017 (in Russ). (Accepted for printing).
76. Desnitsky V. Analysis of energy resource exhaustion attacks on XBee-based nodes in wireless sensor networks. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017) (in Russ.). (Accepted for printing).
77. Levshun D. Reliable communication between cyberphysical elements of the situational monitoring system. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017) (in Russ.). (Accepted for printing).

78. Levshun D. Features of the use of cyberphysical systems for monitoring security in situational centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017) (in Russ.). (Accepted for printing).
79. Branitskiy A. Detection and Prevention of Distributed Network Attacks using the Technologies of Machine Learning. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russian). (Accepted for printing).
80. Fedorchenko A., Kushnerevich A., Saenko I., Kotenko I. An approach for processing big data for security monitoring the distributed situational centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
81. Fedorchenko A., Doynikova E., Kotenko I., Chechulin A. Analysis of security events properties for correlation process for siem-systems. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
82. Parashchuk I., Mikhailichenko N., Sayarkin L., Tkachenko V. Peculiarities of information security on data centers, in data storage systems and in workplaces of distributed situational centers, using the modules of a trusted download. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
83. Komashinsky N. Functional model of a computational cluster for a subsystem for analyzing computer attacks in data centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
84. Merkushev E., Kotenko I. Confidentiality mechanisms of of information in cloud systems of distributed situational centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
85. Doynikova E., Kotenko I., Fedorchenko A. System of incident response for security information and events monitoring. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).

86. Doynikova E., Fedorchenko A., Chechulin A. Features of ontological approach application for the integration of security information. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
87. Kolomeec M. Usage of visual analytics in distributed situational centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017) (in Russ.). (Accepted for printing).
88. Komashinsky N., Kotenko I. The Neural Network Analysis Subsystem of Computer Attacks to Protect the Cloud Platform in Data Centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
89. Merkushev E., Kotenko I. The mechanisms for ensuring the availability of cloud services for distributed situational centers. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
90. Parashchuk I., Copchak Ya., Nogin S., Mulyarchik K. Evaluation of the Effectiveness of the Information Security System of Situational Centers: Trends in Modeling and Development of Methodology. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
91. Pronoza A., Chechulin A. Research of individual interests of senior classes pupils in social networks in order to prevent their participation in unlawful activities. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
92. Saenko I., Loktionov O. Ensuring the Security of Information Interaction of Situational Centers in Software-configurable Networks. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).
93. Chechulin A., Doynikova E., Fedorchenko A. An approach for information security repository construction and application. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russ.). (Accepted for printing).

94. Ushakov I., Kotenko I. The Database Model of the Security Systems of Distributed Situation Centers for Big Data Processing. The All-Russian Forum "The System of Distributed Situation Centers as the Basis for Digital Transformation of Public Administration" (SDSC-2017). 2017 (in Russian). (Accepted for printing).

Other publications

95. Kotenko I., Chechulin A., Branitskiy A. Generation of Source Data for Experiments with Network Attack Detection Software. The 5th International Conference on Science & Engineering in Mathematics, Chemistry and Physics 2017 (ScieTech 2017), Bali, Indonesia, 21-22 January 2017. P.236-245.
96. Saenko, I., Lauta, O., Kotenko, I.: Analytical modeling of mobile banking attacks based on a stochastic network conversion technique. IT Convergence Practice, Vol. 4, no. 4, pp. 1-10. 2016.
97. Kotenko I., Saenko I., Ageev S. Monitoring the State of Elements of Multi-service Communication Networks on the Basis of Fuzzy Logical Inference. The Sixth International Conference on Communications, Computation, Networks and Technologies (INNOV 2017). October 8-12, 2017. Athens, Greece. IARIA, 2017. P.26-32.
98. Kotenko I. Big Data Technologies for Monitoring Computer Security. XIX scientific and practical conference "RusCrypto'2017". Moscow Region, Solnechnogorsk, March 22-24, 2017. http://www.ruscrypto.ru/ (in Russ.).
99. Desnitsky V. Analysis of attacking influences on energy resource exhaustion in Internet of Things systems. XIX scientific-practical conference «RusCrypto’2017». Moscow Region, Solnechnogorsk, March 22-24, 2017. http://www.ruscrypto.ru/ (in Russ.).
100. Chechulin A. Graphical models for visualization of securitu metrics in a computer network. XIX scientific-practical conference «RusCrypto’2017». Moscow Region, Solnechnogorsk, March 22-24, 2017. http://www.ruscrypto.ru/ (in Russ.).
101. Kushnerevich A.G. Development and evaluation of a software platform for parallel distributed processing of security event data. XIX scientific-practical conference «RusCrypto’2017». Moscow Region, Solnechnogorsk, March 22-24, 2017. http://www.ruscrypto.ru/ (in Russ.).
102. Levshun D., Chechulin A. Development of the information search interface in unified repository of multimedia data from field ethnographic expeditions. Universum: Technical science: digital science journal. 2017. № 4 (37). URL: http://7universum.com/ru/tech/archive/item/4623 (in Russ.).
103. Kotenko I., Saenko I. SIEM-systems for monitoring and managing incidents. Transport safety and technology. № 4(51), 2017. P. 96-97.

Laboratory of Information-Analytic Technologies for Economics

Head of Laboratory: Dr. Tech. Sci., Professor Igor V.Lysenko – modeling, technologies of information analysis, economic analysis of techno-organizational and socio-economic systems, planning–programming–budgeting and management, models and methods of technological processes planning in corporate governance systems, fuzzy numbers and fuzzy functions theory and its applications, ilys@iias.spb.su.

Laboratory Staff – 8 members.

Research Activities

Modeling, information technologies, organizational, technical and socio-economic systems research at various stages of their life cycle, public programs planning, models and methods for technological processes planning, development of the theory of fuzzy numbers and functions, the analysis and synthesis of organizational, technical, social and economic systems, estimation of systems potential, capabilities, efficiency of functioning, the mesoeconomic analysis, the theory of optimum control.

Research Fellows

Leading researcher Dr. Tech. Sci., Professor Boris K. Grankin– modeling and system analysis for technical complexes functioning, advanced information technologies for technical complexes design, borisgrankin@mail.ru

Leading researcher Dr. Tech. Sci. Alexey V. Fedorov– System analysis methodology and methods for rocket-space complexes design and exploitation, with application to economics; the problems of monitoring and diagnosing technical condition, afedor62@yandex.ru

Senior researcher Cand. Tech. Sci., Associate Professor Dmitry V. Bakuradze – modeling of complex technical systems, operations management, optimization of systems functioning, bdv@iias.spb.su

Senior researcher Cand. Tech. Sci., Associate Professor Alexander Geida – transformational modeling theory, socio-economic systems capability and risks assessment and investigation, model based architecture of software for project management, geida@iias.spb.su

Grants and Projects

Lysenko I.V., Grankin B.K. – Grant of the Russian Foundation for Basic Research (RFBR) No. 15-08-01825-a “Conceptual and methodological foundations of crucial objects technical condition management on the basis of their monitoring", 2d stage: "Concept of technical state guidance system architecture on the base of technical monitoring”, 2017.

Geida A.S., Bakuradze D.V. – Grant of the Russian Foundation for Basic Research (RFBR) No. 16-08-00953 A “Conceptual and methodological foundations of theory of complex technical system’s potentiality", 1st stage: "Development of systems and processes of

their functioning problem analysis, as problem of system's potentiality investigation", 2017

Lysenko I.V., Grankin B.K. – Federal Space Program for 2016-2025. The project No. 47702388027160001850/3/C10/2017 of October 27, 2017. "NAKU–KA-18" the 1-st stage: "Conceptual designs for the modernization and development of CCAR and RBD creation", 2017.

Lysenko I.V., Fedorov A.B. – Federal Space Program for 2016-2025. The project No. 47702388027160001850/3/C10/2017 of October 27, 2017. "NAKU–KA-18" 2-nd stage: "Modernization and development of the ISIO design projects materials creation", 2017.

Lysenko I.V., Grankin B.K. Federal Program 1 (FP1). The project No. 540-2015/3 of Novemeber 3, 2015. Code VNS–NT–2-SPIIRAN: "Research of the methodical and legal base for providing stability of production of missile weaponry products and missile and space equipment". Code "VNS-NT-2-SPIIRAN" 2-nd stage: "Research and suggestions development to enhance methodological apparatus (methods, metrics, indicators) and refining, to ensure stability of production in the conditions of the destabilizing action factors of technological, technical and production nature (paragraph 3.2.4)".

Lysenko I.V., Grankin B.K. Federal Program 1 (FP1). The project No. 540-2015/3 of Novemeber 3, 2015. Code VNS–NT–2-SPIIRAN: "Research of the methodical and legal base for providing stability of production of missile weaponry products and missile and space equipment". Code "VNS-NT-2-SPIIRAN" 3-rd stage: "Research and suggestions development for methods and analytical means development for risk estimation and reduction under accidents of different types conditions during complex of space rocket preparation activities realization (paragraph 3.2.5)".

Conferences

3rd International Conference on Industrial Engineering (ICIE-2017). Sustainable Development of Industrial Enterprises. 16-19 May, 2017, St. Petersburg, Russia – Geyda A.S.

System of the Distributed Situational Centers as Basis of Digital Transformation of Public Administration conference, 25-27 October, 2017, St. Petersburg, Russia – Geyda A.S.

The eighth All-Russian scientific and practical conference on a simulation modeling and its application in science and the industry "A simulation modeling. Theory and practice" (IMMOD-2017). St. Petersburg, Russia – Geyda A.S.

International scientific and practical conference "Automation: problems, ideas, decisions", September 8, 2017, Sterlitamak – Geyda A.S.

10th international scientific and technical ARMIMP-2017 conference, October 1-4, 2017, Suzdal, Russia – Fedorov A.V.

Intellectual property Registered in the Reporting Year

Kokarev A.S., Ptushkin A.I., Bogdanov, V. O., Lysenko, I. V. The program of spare parts calculation for complex technical systems from line items of their main developers..Registered in the Computer Program Registry, № 2017662453.

Dyakov, A.N., Reshetnikov, D. V., Bogdanov, V. O., Lysenko, I. V. Optimum strategy of maintenance and repair choice Registered in the Computer Program Registry, № 2017662088.

Recent Results

1. Concepts and principles of the improved systems operational properties research are presented [1, 2].
2. Method of systems modelling with informational and not informational actions models realization on the basis of the alternative stochastic the simplexed networks usage is offered [5, 6].
3. Modelling case study in informational technologies operational properties research problems is made, schemes of modelling and models templates used for the solution of the specified objectives [3] are offered.
4. Software blueprint for the solution of complex systems operational properties research problems is developed [13].

References

Papers Published in Editions Indexed by WoS, Scopus

1. Geyda A.S., Lysenko I.V. Schemas for the analytical estimation of the operational properties of agile systems. SHS Web Conf. Volume 35, 2017.
2. Geyda A.S., Lysenko I.V. Operational properties of agile systems and their functioning investigation problems: conceptual aspects. Prikladnaya informatika — Journal of Applied Informatics, 2017, vol. 12, no. 5 (71). pp. 93-106.
3. Geyda A.S., Lysenko I.V., Yusupov R.M. Information technologies usage operational properties research: Models. SPIIRAS Proceedings. 2017.
4. Marusina, M.Y., Fedorov, A.V., Berkutov, I.V., Bychenok, V.A. Evaluation of the Influence of External Factors in Ultrasonic Testing of Stress-Strain States. Measurement Techniques. 2017. Vol. 59. No. 11, pp. 1165-1169.

Papers Published in Russian Editions Indexed by RSCI

5. Geyda A. S., Grankin B.K., Lysenko I. V. The alternative stochastic simplixed networks of operations and their usage when scheduling technological processes with the changing purpose. Collection of articles of the international scientific and practical conference "Automation: problems, ideas, decisions" (Chelyabinsk, 08.09.2017). Sterlitamak. pp. 13-17.
6. Geyda A.S., Grankin B.K., Lysenko I.V. Alternative stochastic simplexed networks of technological operations for accounting of

effects of informational operations. Economy and society. No. 9(40). 2017.
7. Grankin B.K., Gravchenko Yu.A., Zhiganov E.B., Mokan D.O. The solution of practical problems of the structural and functional researches of the composite technical systems with use of coding of counts. Works VKA by it. A.F. Mozhaysky. No. 656, 2017. V.656. pp. 6-8.
8. Geyda A.S., Lysenko I.V., Yusupov R.M. Research of informational technologies usage operational properties: concepts and the principles of modelling. St. Petersburg society of informatics, computer facilities, communication systems and management (SPOISU). Anniversary XV S.'s works - the St. Petersburg conference "REGIONAL INFORMATICS (RI-2016)" St. Petersburg, October 26-28, 2016. S-Pb.: 2017.
9. Golikov I.O., Grankin B.K., Zvyagin V.I. Training in quality by standards. "Standards and quality". No. 2. 2017. pp. 29-33.
10. Golikov I.O., Grankin B.K. Standards quality: opinion of interested parties. "Standards and quality". No. 6. 2017. pp. 28-32.
11. Ivanova E.I., Fedorov A.V., Astredinova N.V., Ilyinsky A.V., Ashikhin D.S. Estimation of optical technique application possibility in a problem of dynamic dimpling process characteristics motion filing. Scientific and technical letters on informational technologies, mechanics and optics. 2017. T. 17. No. 4(110). pp. 620-627.
12. Shayakhmetkyza D., Krasnov I.O., Fedorov A.V. Research and development of method and system of measurement of displacement of the facilities control points taking into account external impact factors. Collection of Abstracts and Reports. IET – 2017. pp. 78-79.

Other publications

13. Geyda A.S. Concept and model of a of informational technologies usage operational properties research in the conditions of digital economy. Reports of the "System of the Distributed Situational Centers as Basis of Digital Transformation of Public Administration" conference. (October 25-27, 2017, St. Petersburg).
14. Geyda A.S., Leonova O.N., Lysenko I.V. Multiapproach simulation modeling usage at palliative medicine problem solving.The Eighth All-Russian scientific and practical conference on a simulation modeling and its application in science and the industry "A simulation modeling. Theory and practice" (IMMOD-2017). St. Petersburg, 2017.
15. Stepanova K.A., Ashikhin D.S., Fedorov A.V., Kostyukhin A. S., Yakovlev Yu.O. Results of application of the automated method of optical checking of technological process of friction welding with hashing. Optical-acoustic and radar methods of measurements and information processing: Materials of the 10th International scientific and technical conference ARMIMP-2017, Suzdal, 2017. pp. 245-247.

Laboratory of Computer – Information Systems and Programming Technologies

Head of the Laboratory: Dr. Tech. Sci., Profesor Vasiliy Yu.Osipov – mathematical modeling, intelligent systems, neural networks, information security, osipov_vasiliy@mail.ru

Laboratory Staff – 17 members, 2 scientific degree applicants, 4 post graduate stiudents.

Research Activities

Corporate user systems; parallel and distributed data processing; dynamic architecture supercomputers (DASC); GRID technologies; cloud computing; neural networks; computer modeling; mathematical modeling; risk analysis and modeling for information systems; information security; network security monitoring; object oriented programming; software engineering; artificial intelligence; cognitive technologies; software design automation.

Research Fellows

Chief researcher Dr. Phys. - Math. Sci., Professor Sergei N. Baranov – software engineering, SNBaranov@iias.spb.su

Chief researcher Dr. Tech. Sci., Professor Vladimir. I. Vorobiev– modeling and design of information protection systems, automation of parallel and distributed programming, cluster and GRID-technologies, e-document circulation, vvi@iias.spb.su

Chief researcher Dr. Tech. Sci., Professor Victor V. Nikiforov h – real-time operating systems, embedded real-time software systems, nik@iias.spb.su

Senior researcher Cand. Tech. Sci., Associate Professor Nikolay G. Mustafin – decision theory, image processing, technologies of information system engineering, nikolay.mustafin@gmail.com

Senior researcher Cand. Tech. Sci. Vladimir M. Shishkin - information security, security and risk modeling and analysis, social technology systems security, vms@iias.spb.su

Senior researcher Cand. Tech. Sci Rosa R. Fatkieva – information security, information systems modeling, rrf@iias.spb.su

Senior researcher Cand. Phys. - Math. Sci. Elena L. Evnevich– cloud and distributed computations, cognitive technologies, eva@iias.spb.su

Senior researcher Cand. Tech. Sci. Natalia A. Zhukova – cognitive monitoring, automated synthesis of observed objects models, software engineering, nazhukova@mail.ru

Researcher Dmitry K. Levonevsky– information security, corporate information systems, mathematical and computer modeling, dl@iias.spb.su

Junior researcher Ph.D. Sergey A. Podkorytov– theory of fractals, 3D modeling, neural networks, podkorytovs@gmail.com

Academic degree applicants

Dmitry K. Levonevsky, applicant for Cand. Tech. Sci. degree – Methods and Models of Adaptive Protection from Unreliable Information, Supervised by Profesor Vasiliy Yu.Osipov

Natalia A. Zhukova, applicant for Dr. Tech. Sci. Degree – Synthesis of Processes for Cognitive Monitoring of Distributed Objects. Supervised by Profesor Vasiliy Yu.Osipov

Post-graduate students

Mikhail Yu. Uzdyaev– Models and Methods of Robotic Control by Neural Networks, Supervised by Profesor Vasiliy Yu.Osipov

Dennis V.Obrezkov– Performance Maintenance of Hard- Software System for Inertial Satellite Navigation under Obstructing Interference, Supervised by Cand. Tech. Sci Rosa R. Fatkieva.

Sergey R. Ryzhkov– Cloud Computing Security, Supervised by Profesor Vladimir I. Vorobiev

Vladimir A. Vasyukov– Models and Methods of Automated Computer Network User Protection from Destructive Reflective Control, Supervised by Cand. Tech. Sci. Vladimir M. Shishkin

Grants and Projects

Baranov S.N., Mustafin N.G. – Grant 074-U01 of the Government of the Russian Federation on the scientific research work №713574 "Bioinformatics, Machine Learning, Software Engineering, Coding Theory, Proactive Systems" in the frames of implementation of the 2013-2020 Program aimed at increasing the competitive power of the ITMO University among world leading educational centers (action #1.1.2, purchase #1.1.2.50 of the "Roadmap" for Program realization (joint project with the ITMO University).

Osipov V.Yu., Fatkieva R.R., Shishkin V.M., Levonevsky D.K. – RFBR grant 16-29-09482 ”Forecasting of information network terrorist threats and substantiation of respective countermeasures in megapolises”. Contract № 16-29-09482 from September 19, 2017.

Osipov V.Yu, Baranov S.N., Tsarev I.V. – Subprogram No III.3.4 of Fundamental Research of the ONIT RAS “Architectural and software decisions and security assurance of supercomputer information and computing complexes of new generations”, Direction No 1: “Architectural and software solutions in supercomputer informational and computing complexes of new generations”, Project No 1.5 “High performance computing systems with dynamic architecture”.

Osipov V.Yu, Vorobiev V.I. – Program No 1.5 P of Fundamental Research of the ONIT RAS “Problems of creating high performance distributed and cloud systems and technologies. Intelligent information technologies and systems”.

University Courses

St.Petersburg State Electrical Engineering University, chair of information systems, “Methods and Means of Information Security” (Vorobiev V.I.).

St.Petersburg State Electrical Engineering University,, chair of information security, “Fundamentals of Information Security” (Fatkieva R.R., Shishkin V.M.).

St.Petersburg State Electrical Engineering University, chair of computer software, “Decision Making Theory” (Zhukova N.A.).

St.Petersburg State Electrical Engineering University,, chair of information systems, “Decision Making Theory”, “Optimization Methods” (Mustafin N.G.).

St.Petersburg State Polytechnic University, chair of information and control systems, "Methodology of Scientific Research" (Baranov S.N.).

St.Petersburg State University for Aerospace Instrumentation, the research and educational center SPIIRAS-SUAI, "Software Engineering Technology" (Baranov S.N.).

SPIIRAS post-graduate programme “Mathware and Software of Computing Complexes and Computer Networks”, section “Real-time Systems” – Nikiforov V.V., section “Software Project Maintenance” (Baranov S.N.).

ITMO University, chair of computer science and applied mathematics, «Intelligent systems and technologies», «Intelligent data analysis», «Project management», «Machine learning», «Research and internship» (Zhukova N.A.).

St.Petersburg Power Industry Institute for Advanced Training (PEIPK), “Risks and Regulations of Information Security Assurance at Power Industry Enterprises” (Shishkin V.M.).

Conferences

XIII Baltic Science and Engineering Contest 2017, January 30 – February 2, 2017, Saint Petersburg, Russia – http://baltkonkurs.ru/features/ – Baranov S.N.

III International Scientific and Practical Conference “Problems of Information Security”, February 16-18, 2017, Simferopol-Gurzuf – Shishkin V.M., Vorobiev V.I., Evnevich E.L.

Practical Conference “Blockchain Technologies”, February 28, 2017, Moscow, Russia – Levonevskiy D.K.

10th International Conference "Polynomial Computer Algebra" (PCA-2017), April 17-21, 2017, St. Petersburg, Russia – Baranov S.N.

12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings – 2017" – Osipov V.Yu.

XXVI All Russian Scientific Conference “Intellectual Renaissance”, April 21-24, 2017, Saint Petersburg, Russia – Shishkin V.M.

V Russian International Energy Forum. "Ensuring the Security of the Critical Information Infrastructure of the Fuel and Energy Complex", April 25, 2017, St. Petersburg, Russia – Shishkin V.M.

International Research and Practice Conference “Theoretic and Applied Aspects of Information Security”, Academy of the Ministry of Home Affaires of the Republic of Belarus”, May 18, 2017, Minsk, Republic of Belarus– Shishkin V.M.

Workshop on Data Analysis in Medicine (WDAM-2017), May 29, 2017, Moscow, Russia – Zhukova N.A.

Computational Science and Its Applications (ICCSA 2017), July 3-6, 2017, Trieste, Italy – Osipov V.Yu., Zhukova N.A.

6th International Conference on Analysis of Images, Social Networks, and Texts (AIST'2017). July 27-29, Moscow, Russia– Zhukova N.A

33th International Conference on Forth Language (euroFORTH-2017), September 5-11, 2017, Bad Vöslau, Austria, – http://euro.theforth.net/ – Baranov S.N.

22nd International Conference on Urban Planning, Regional Development and Information Society. September 12–14, 2017, Vienna, Austria – Zhukova N.A.

2nd International Conference on Interactive Collaborative Robotics (ICR-2017), September 12-16, 2017, Hatfield, UK, – Levonevskiy D.K.

19th International Conference on Speech and Computer (SPECOM-2017), September 12-16, 2017, Hatfield, UK, – Levonevskiy D.K.

XI International School-Symposium “Analysis, Modeling, Control, Development of Social and Economical Systems” (AMUR-2017), September 14-27, 2017, Simferopol – Sudak – Shishkin V.M.

III Interregional Science and Practice Conference “Perspective Directions of National Information Technologies Development”, September 19-23, 2017, Sevastopol – Shishkin V.M., Mustafin N.G., Fatkieva R.R., Vorobiev V.I., Levonevskiy D.K., Evnevich E.L.

4th International Conference “Development of Computer Engineering in Russia and Former Soviet Union Countries: History and Outlook” (SoRuCom-2017), October 2-6, 2017 Moscow, Zelenograd, Russia – http://www.sorucom.org/ – Baranov S.N.

The 29th IFIP International Conference on Testing Software and Systems (ICTSS-2017), October 9-11, 2017, St. Petersburg, Russia – https://www.ictss2017.org/ – Baranov S.N.

10th International Conference on Security of Information and Networks (SIN-2017), October 13-15, 2017, Jaipur, India – Levonevskiy D.K., Vorobiev V.I., Fatkieva R.R.

8th All Russia Science and Practice Conference on Imitation Modeling and Its Applications in Science Industry “Imitation Modeling. Theory and Practice” (IMMOD-2017). October 18-20, 2017, St. Petersburg, Russia – Shishkin V.M.

All Russia Forum “SRSC-2017” System of Distributed Situational Centers as a Basis of Digital Transformation of the Public Administration, October 25-27, 2017, St. Petersburg, Russia – Shishkin V.M., Bachiev R.I., Uzdyaev M.Yu.

3rd International Scientific Conference “Technological Outlook in the Eurasian Space: New Markets and Points of Economical Growth”, October 26-28, 2017, St. Petersburg, Russia – Bachiev R.I., Uzdyaev M.Yu.

Anniversary X Saint Petersburg Interregional Conference “Information Security of Regions of Russia (IBRR-2017)”, November 1-3, 2017, St. Petersburg, Russia – Vorobiev V.I., Fatkieva R.R., Evnevich E.L., Petrov M.Yu., Shishkin V.M., Ryzhkov S.R.

28th DAAAM International Symposium on Intelligent Manufactoring and Automation. November, 8-11, 2017, Zadar, Croatia – Nikiforov V.V.

International Science and Engineering Conference “Information Technologies and Mathematical Modeling of Systems” (ITMMS-2017), November 20-22, 2017, Moscow region, Odintsovo, Russia – Shishkin V.M.

Scientific and Practical Conference “Information Security Monitoring: Problems of Building and Operating”. Information Security Center, November 21, 2017, Moscow, Russia – Shishkin V.M., Vorobiev V.I.

Neuroforum: “Possibilities of Neuronet Development on the Global Market” (NEUROFORUM-2017), November 23-26, 2017, St. Petersburg, Russia – Bachiev R.I., Uzdyaev M.Yu., Levonevskiy D.K., Podkorytov S.A., Ryzhkov S.R., Evnevich E.L.

IV International Scientific and Practical Conference “Development, Security and Cooperation Analytics: Big Eurasia - 2030”, November 29, 2017, Moscow, Russia – Shishkin V.M.

6th National Supercomputer Forum (NSCF-2017), November 28 – December 1, 2017, Pereslavl’ Zalessky, Russia – Fatkieva R.R., Vorobiev V.I., Petrov M.Yu, Evnevich E.L.

Research Management

XIII Baltic Science and Engineering Competition 2017, Saint Petersburg, January 30 - February 2, 2017 – chairman of the scientific jury of the section “Computer Programming” – Baranov S.N.

III International Scientific and Practical Conference “Problems of Information Security”, Vernadsky KFU, Simferopol-Gurzuf, February 16-18, 2017 – chair of the organizing committee – Shishkin V.M.

XXVI All-Russia Scientific School Conference “Intellectual Renaissance”, Saint Petersburg, April 2017, section supervision, jury participation – Shishkin V.M.

III Interregional Science and Practice Conference “Perspective Directions of National Information Technologies Development”, Sebastopol, September 19-23, 2017, - session co-chair Shishkin V.M.

8th International Workshop "Program Semantics, Specification and Verification: Theory and Applications" (PSSV 2017), Moscow, 26 June 2017 – membership in the Program Committee – Baranov S.N. http://persons.iis.nsk.su/en/PSSV2017

33nd EuroForth Conference, Bad Vöslau, Austria, 5-11 September 2017 http://euro.theforth.net/ – member of the Program Committee – Baranov S.N.

International Forth Standard Committee http://www.forth200x.org/meetings/minutes2017.pdf – member of the committee – Baranov S.N.

29th IFIP International Conference on Testing Software and Systems ICTSS-2017, St.Petersburg, 9-11 October 2017 https://www.ictss2017.org/ – member of the Program Committee – Baranov S.N.

Anniversary X Saint Petersburg Interregional Conference “Information Security of Regions of Russia (IBRR-2017)”, Saint Petersburg, November 1-3, 2017 – members of the program committee – Vorobiev V.I., Shishkin V.M.; section work programmes development, session organization, section reports creation – Vorobiev V.I., Shishkin V.M.

Ongoing city seminar "Informatics and Computer Technologies", twice a month, SPIIRAS; in 2017: 6 sessions, 7 reports, 11 participants at average, http://conference.spiiras.nw.ru/seminar_ICT – seminar chairman Baranov S.N.

International Cooperation

Toulouse Research Institute for Informatics (IRIT – Institut de Recherche en Informatique de Toulouse, http://www.irit.fr/), France – joint research and publications on theoretical foundations of informatics.

Uppsala University, Sweden, department of Computer Science – theoretic foundations of informatics, software engineering, modeling in the sphere of physiology and medicine.

Fraunhofer Institute for Open Communication Systems – FOKUS, Berlin, Germany – interoperable systems.

Academy of the Ministry of Home Affaires of the Republic of Belarus and the National Academy of Science of the Republic of Belarus – issues of information security.

Membership in Domestic and International Societies, Editorial Boards, etc.

Professor Sergei N. Baranov – professional member of the ACM (Association for Computing Machinery); professional member of the IEEE (Institute of Electrical and Electronics Engineers); member of the editorial board of "SPIIRAS Proceedings"; reviewer of American Mathematical Society (Mathematical Reviews); member of the committee on standard of the Forth language (Forth Standards Committee); member of the editorial board of a journal “System Informatics”.

Profesor Vladimir I. Vorobiev – member of the editorial board of the “Nauchny Vestnik NGTU», Novosibirsk

Cand. Tech. Sci Rosa R. Fatkieva – reviewer in the journal “Mathematics and Statistics” (ISSN: 2332-2144).

Dmitry K. Levonevsky – member of the IEEE (Institute of Electrical and Electronics Engineers).

Recent Results

1. Formulation of theoretical design principles of small cognitive neural network machine based on controllable memristive matrices possessing functional capabilities for associative processing of heterogeneous information; the above machine to be used in small self-learning autonomous robots that perform various tasks in the environments which are dangerous for humans and are difficult to access, in particular in space [3].
2. Methods development for analyzing logical and dynamic correctness of multitask software complexes by means of construction of special multi-partite graphs of dependencies of synchronizing operators: linking graphs, which provide verification of the logical correctness of multitask applications (the correctness of intersections of pairs of critical intervals), and linking graphs and critical intervals that verify dynamic correctness of applications for time-sharing systems [8].
3. Development of approach to feasibility testing of multitask real-time applications under different scheduling modes and protocols of access to shared common information resources when executing an application on a multi-core computing platform. The approach is based on the concept of software application density, the value of which is determined by evaluating the feasibility of this application, depending on the processor performance and the number of cores of the multi-core platform. The tool is the developed simulation software which provides more accurate estimates in comparison with known analytical methods [9].
4. Development of technique for testing the executive cores that control the operation of real-time software systems in embedded systems. The technique draws on the use of a special language of script description that form tests for the separate functions of executive cores [10].
5. Development of algorithms enabling analysis of multi-task software complexes as regards the possibility of mutual blocking of tasks in the process. Estimations of the developed algorithms show that their complexity depends linearly on the sum of the number of links of critical intervals and of the number of pairs of such links that correspond to the special condition of dependence [16].
6. Development of the modeling system on the principles of a machine with a dynamic architecture for the purposes of programming and research of neural networks. Development of a new version of the Yard-2017 language for the above networks programming and of a prototype of the NeuroYard software for compiling and conducting ex-

periments in this language. A special feature of the development is the use of the Forth language together with an Forth-system tool for creating and debugging all the components of the above software [38].

7. Development of algorithms for simulation of high-performance computing systems with dynamic architecture (DAS) on the basis of dynamic automata networks (DAN), realizing artificial recurrent neural networks (RNN) with associative-spatial memory addressing [38].

8. Translation algorithms development for Yard language (formal language processor) based on the updated VFX Forth tool system for Windows IA32. Formulation of the principles of presentation of recurrent neural networks based on the DAS [38].

9. Solution of the problem of integrating verbal models and means of monitoring of security events at the physical level, enabling to establish a semantic connection with the final indicators expressed in meaningful terms of damage. The implementation of the approach is based on the methodological and technological integration of the risk analysis system, developed in order to determine the stochastic risk profile according to a priori data of predominantly expert nature and is intended for the real-time use with SIEM class systems. The main source of initial information in this case is event monitoring data with dynamic recalculation of risk factors assessments being permanently updated and refined as the amount of data increases [2, 18, 19, 21, 30, 35, 44, 46].

10. Design of the architecture of the corporate multimodal information and navigation cloud system (MINOS), description of its components as well as the basic principles of the corporate television subsystem. Formation of a set of infrastructure components necessary for efficient system functioning. Creatiovn of scenarios for interaction with various types of users, description of content management principles [17].

11. Research of the problems of integration of corporate information infrastructure components into an enterprise smart space. Formalization for the smart space functioning scenarios on the basis of the temporal logic of actions and description of a multilevel model of corporate service integration [14].

12. Analysis of the current state in the field of protection against false information in computer networks and outlining of current problems related to this protection. Description of an approach to assessing protection activities on the basis of the Markov chain of the disinformation process. Design of the architecture of a future system of data analysis which results in enhancement of the methods of text trustworthiness analysis. The proposed complex approach, based on the known and suggested methods, enables detecting false information in computer networks promptly. Furthermore, the proposed method can be used for countering terrorist activities and cybercrimes in order to search for network resources which may be involved in unlawful activities [4, 40].

13. Analysis of the possibility of gamification in the sphere of network admininstering education using virtualization and cloud technologies. The introduction of game concept and its implementation method. The approach can be used in education providing a high level of involvement, efficiency and simplifying the process of deployment of the virtual education facilities [13].
14. Development of theoretical bases of cognitive monitoring of distributed objects. It includes conceptual propositions and a generalized structure of such processes. Feasibility studies of a cognitive machine application to control of the monitoring processes. The machine is able to perform the adaptive analysis of information streams coming from the observed objects taking into account the context of the current situation. Creation of generalized mathematical models of cognitive monitoring on the basis of new hierarchical relatively finite state machines [7, 41].
15. Consideration of the methods of multilevel synthesis of models of objects and cognitive monitoring processes as well as the method and the model of cognitive data processing. The cognitivity of data processing is ensured by the system of transformation of source streams. Development of a new flexible architecture approach in order to create information system. The approach includes method of flexible designing, building and supporting such systems [5, 7, 41].
16. Design of an ontology-based model of cognitive secure data storage. The model enables creating flexible and dynamic system able to store data more efficiently due to ontological structuring and categorization of data considering their importance and relevance which result in the disk storage space optimization [1, 28, 36].

References

Monographs

1. Information security of socio-economic systems: monograph / Apatova NV and etc.; Ed. Doctor of technical sciences. prof. Boychenko O.V. Simferopol: IP Zueva TV, 2017. 302 p. (Chapters 1.6, 3.4 – Shishkin V.M., Chapter 2.1 – Vorobiev V.I., Evnevich E.L.).
2. Information-psychological and cognitive security. Collective monograph / Ed. I.F. Kefeli, R. M. Yusupov. Publishing house "Petropolis", St. Petersburg, 2017. 300 p. (Section II, Chapter 4 Osipov V.Yu., Section III, Chapter 5 – Shishkin V.M.)

Papers Published in Venues Indexed in WoS, Scopus

3. Osipov V. Structure and basic functions of cognitive neural network machine. MATEC Web of Conferences 113, 02011 (2017), pp. 1-5.
4. Osipov V. Yu., Vorobiev V.I., Levonevsky D.K. Problems of protection against false information in computer networks. SPIIRAS Proceedings. 2017. Issue 4 (53), pp. 97-117.

5. Osipov V., Lushnov M., Stankova E., Vodyaho A., Zhukova N. Inductive Synthesis of the Models of Biological Systems According to Clinical Trials. ICCSA 2017, Part I, LNCS 10404, pp. 103-115, 2017.
6. Osipov V., Vodyaho A., Stankova E., Zhukova N., Zeno B. Finding Motifs in Medical Data. ICCSA (5) 2017: pp. 371-386.
7. Osipov V., Vodyaho A., Zhukova N., Glebovsky, P. Multilevel Automatic Synthesis of Behavioral Programs for Smart Devices / 2017 International Conference on Control, Artificial Intelligence, Robotics & Optimization (ICCAIRO), 978-15090-6536-3 / 17 2017 IEEE, pp. 335-340. DOI 10.1109 / ICCAIRO.2017.68
8. Nikiforov V.V., Baranov S.N. Static verification of task access to shared resources in real-time systems. Proceedings of SPIIRAS. 2017. Vol. 3 (52), pp.137-156.
9. Baranov S.N., Nikiforov V.V. Analysis of Real-Time Applications Feasibility through Simulation. Automatic Control and Computer Sciences, 2017. Vol. 51, No. 7, pp. 479-488, 2017.
10. Nikiforov V.V., Baranov S.N. A Flat Chart Technique for Embedded OS Testing. Proc.ISP RAS, 2017, vol.29.
11. Sokolov B., Zelentsov V., Mustafin N., Kovalev A., Kalinin V. Methods and algorithms of ship-building manufactory operation and resources scheduling. The 19th International Conference on Harbor, Maritime & Multimodal Logistics Modeling and Simulatio (HMS2017), September 18-20, 2017, Barselona, Spain, pp. 81-86.
12. Kashevnik A., Lashkov I., Parfenov V., Baraniuc O., Mustafin N. Context-Based Driver Support System Development: Methodology and Case Study. Proceedings of the 21st Conference of the Open Innovations Association FRUCT, Helsinki, Finland, November 6-10, 2017.
13. Levonevsky D.K. Gamified learning as a cloud service. Software systems: theory and applications. 2017. No. 8: 1 (32), pp. 209-217.
14. Levonevskiy D., Vatamaniuk I., Saveliev A. Integration of Corporate Electronic Services into a Smart Space Using Temporal Logic of Actions. Proceedings of the 2nd International Conference on Interactive Collaborative Robotics (ICR-2017), Springer, 2017, pp. 134-143.
15. Novikov F., Fedorchenko L., Vorobiev V., Fatkieva R., Levonevskiy, D. Attribute-Based Approach of Defining the Secure Behavior of Automata Objects. Proceedings of the 10th International Conference on Security of Information and Networks (SIN-2017), Jaipur, India, October 13-15, 2017 (In press).

Papers Published in Russian Journals and Editions Indexed by RSCI

16. Nikiforov V.V., Podkorytov S.A. Algorithms for Checking Applicability of Resource Access Protocols in Real-Time Systems. Information and control systems, №4 (89), 2017, pp. 57-66.

17. Levonevsky D.K., Vatamanyuk, I.V., Saveliev, A.I. Multimodal information and navigation cloud system MINOS for the corporate cyber-physical smart space. Software Engineering. 2017. №3. pp. 120-128.
18. Shishkin V.M. Targeted approach to integrated information security of situation centers. All-Russian Forum "SRSC-2017" System of distributed situational centers as a basis for digital government transformation. St. Petersburg, October 25-27, 2017. SPb., 2017.
19. Shishkin V.M., Kolesnikov K.E. Feasibility studies of adaptive control in the dynamic model of confrontation. Information technologies and mathematical modeling of systems "ITMMS 2017" International Science and Technology Conference, Moscow Region, Odintsovo, November 21, 2017: Proceedings (In press).
20. Shishkin V.M. The Doctrine of Information Security of the Russian Federation - retrospective and perspective. Problems of Information Security: Proceedings of the III International Scientific and Practical Conference, Simferopol-Gurzuf, February 16-18, 2017 Simferopol, 2017. pp. 17-18.
21. Shishkin V.M., Kolesnikov K.E. Investigation of the dynamics of symmetric confrontation on a differential model. Problems of Information Security: Proceedings of the III International Scientific and Practical Conference, Simferopol-Gurzuf, February 16-18, 2017 Simferopol, 2017. pp. 68-69.
22. Vorobiev V.I., Evnevich E.L. Ontological methods of access control in the cloud environment. Problems of information security: Proceedings of the III International Scientific and Practical Conference, Simferopol-Gurzuf, February 16-18, 2017 Simferopol. 2017. pp. 6-7.
23. Vorobiev V.I., Monakhova T.V. Metamodel for metadata protection. Problems of information security: Proceedings of the III International Scientific and Practical Conference, Simferopol-Gurzuf, February 16-18, 2017 Simferopol, 2017. pp. 135-136.
24. Bachiev R.I., Uzdyaev M.Yu. Protection of operators of situational centers workstations from visual information and psychological pressure. All-Russian Forum "SRSC-2017" System of distributed situational centers as a basis for digital government transformation. St. Petersburg, October 25-27, 2017. SPb., 2017.
25. Bachiev R.I., Uzdyaev, M.Yu. Cognitive analysis of information and psychological threats with the use of artificial neural networks. Proceedings of the Third International Scientific Conference "Technological perspective within the framework of the Eurasian space: new markets and points of economic growth", St. Petersburg, October 26-28, 2017.
26. Vodyakho A.I., Mustafin N.G., Zhukova N.A. Ontological approach to the development of resource monitoring systems in the cable television networks. Izvestia of St. Petersburg State Electrotechnical University LETI. 2017. № 6. pp. 16-21.

27. Lebedev S.V., Zhukova N.A. Merge of medical data on the basis of ontologies. Ontology of Designing, Vol. 7, No 2(24), 2017. pp. 145-159.
28. Vorobiev V.I., Petrov M.Yu., Evnevich E.L., Fatkieva R.R. Cognitive management of storage and processing of semi structured data. VI National Supercomputer Forum, Pereslavl-Zalessky, November 28 - December 1, 2017. http://www.nscf.ru/materialy-foruma/
29. Shishkin V.M. The new doctrine of information security - structural model and threat assessment. Advanced National Information Systems and Technologies: materials of the III interregional scientific- practical conference. Sebastopol, September 19-23, 2017. Sebastopol: "RIBEST", 2017. pp. 65-67.
30. Shishkin V.M., Kolesnikov K.E. Research of differential model of information confrontation. Advanced National Information Systems and Technologies: materials of the III interregional scientific-practical conference. Sebastopol, September 19-23. Sebastopol: "RIBEST", 2017 pp. 67-69.
31. Shishkin V.M., Berezkin Ya.I Automated system of risk analysis in the training of IT professionals. Advanced National Information Systems and Technologies: materials of the III interregional scientific- practical conference. Sebastopol, September 19-23, 2017. Sebastopol: "RIBEST", 2017 pp. 184-186.
32. Mustafin N.G., Savosin S.V., Sokolov B.V. Inheritance as a factor of development of information systems. Advanced National Information Systems and Technologies: materials of the III interregional scientific- practical conference. Sebastopol, September 19-23, 2017. Sebastopol: "RIBEST", 2017. pp. 18-21.
33. Ryzhkov S.R. Blockchain for geotagging the security perimeter. Information Security of Russian regions (ISRR-2017). Anniversary X St. Petersburg Interregional Conference. St. Petersburg, November 1-3, 2017, 2017. pp. 160.
34. Sokolov B.V., Mustafin N.G., Miller V.E., Savosin S.V. Factors of research and pro-activity in the life cycle of the information system. Information Security of Russian regions (ISRR-2017). Anniversary X St. Petersburg Interregional Conference. St. Petersburg, November 1-3, 2017, 2017. pp.126-127.
35. Shishkin V.M., Kolesnikov K.E. Application of a dynamic model of confrontation to information systems security control. Information Security of Russian regions (ISRR-2017). Anniversary X St. Petersburg Interregional Conference. St. Petersburg, November 1-3, 2017: Conference materials, 2017 (In press).
36. Evnevich E.L., Petrov M.Yu. Protected storage model for big semi structured data. Information Security of Russian regions (ISRR-2017). Anniversary X St. Petersburg Interregional Conference. St. Petersburg, November 1-3, 2017: Conference materials, (In press).

37. Vorobiev V.I., Fatkieva R.R. Quality measurements of information resources security. Information Security of Russian regions (ISRR-2017). Anniversary X St. Petersburg Interregional Conference. St. Petersburg, November 1-3, 2017: Conference materials, (In press).

Other publications

38. Baranov S.N. A Formal Language Processor Implemented in Forth. Proc. 33d EuroForth Conference, September 8-10, 2017. College Garden Hotel, Bad Vöslau, Austria, pp.5-10.
39. Baranov S.N. Development and certification of software for aviation on-board systems and equipment: manual. SPb.: GUAP, 2017. 245 p.
40. Levonevsky D.K. Information terrorism in conditions of global informatization. Training of personnel for the subjects of national security system. History and modernity: materials of the International scientific-practical Conference, Minsk, December 22, 2016: in 2 volumes. Minsk: 2017. V. 1. pp. 308-312.
41. Osipov V., Zhukova N., Vodyaho A. About one approach to multilevel behavioral program synthesis for television devices / International Journal of Computers and Communications, Vol.11, 2017, pp. 17-25.
42. Baymuratov I., Zhukova N. A Formal Framework for Data Fusion. International Journal of Applied Mathematics and Informatics. Vol. 11, 2017, pp. 56-64
43. Shishkin V.M. Security of critical objects: non-linear effects in threat assessment. Training of personnel for subjects of the national security system. History and modernity: materials of the International scientific-practical Conference, Minsk, December 22, 2016: in 2 volumes. Minsk: 2017. V.2. pp. 133-137.
44. Shishkin V.M., Kolesnikov K.E. Dynamic model of confrontation - interpretations and experiments. Analysis, modeling, management, development of socio-economic systems: a collection of scientific papers of the XI International School Symposium AMUR-2017, Simferopol-Sudak, September 14-27, 2017. pp. 438-444.
45. Shishkin V.M. Models for the integrated assessment of risk factors and dynamics of terrorist threats. Theoretical and Applied Aspects of Information Security: Materials of the Intern. Scientificand practical Conf. (Minsk, May 18, 2017), Minsk, 2017.
46. Shishkin V.M., Kolesnikov K.E. Investigation of the processes of confrontation by means of imitation modeling. The Eighth All-Russian Scientific and Practical Conference on Imitation Modeling and its Applications in Science and Industry "Imitation Modeling. Theory and practice "(IMMOD-2017). Proceedings of the conference. St. Petersburg October 18-20, 2017 St. Petersburg. 2017. pp. 213-217.

Laboratory of Autonomous Robotic Systems

Head of the Laboratory: Professor of the Russian Academy of Sciences, Dr. Tech. Sci., Professor Andrey L. Ronzhin – interaction of autonomous robotic systems and users in a cyber-physical environment. ronzhin@iias.spb.su, http://www.robotics.nw.ru

Laboratory Staff – 17 members and 7 post-graduate students.

Research Activities

Development of mathematical models, software and hardware for autonomous robotic systems, including methods of modular, swarm, cloud and anthropomorphic robotics, and prototyping of robots, cyber-physical modules and specialized calculators.

Research Fellows

Senior researcher Cand. Tech. Sci. Vladimir P. Dashevsky – concept and prototype development of onboard calculators for autonomous robotic systems based on standard system modules SMARC, vladimir.dashevsky@gmail.com

Senior researcher Cand. Tech. Sci. Viktor Yu. Budkov – methods and models of audio-visual signal processing in onboard calculators, budkov@iias.spb.su

Junior researcher Nikita A. Pavliuk – construction of ground-based robotic systems and individual nodes, antei.hasgard@gmail.com

Junior researcher Arseniy G. Ivin – multithreaded data exchange systems for robotic complexes, arssivka@yandex.ru

Junior researcher Daniil I. Michalchenko – onboard robot control systems, tekatodsham@gmail.com

Junior researcher Dmitriy A. Malov – methods for organizing the transmission of data between devices in IoT-networks, malovdmitrij@gmail.com

Junior researcher Maxim M. Bizin – intelligent embedded control systems of technical objects, bizin@iias.spb.su

Junior researcher Michail Yu. Kuzov – sensory systems of anthropomorphic robotic mechanisms, mhkz@mail.ru

Junior researcher Petr A. Smirnov – construction and prototyping of robotic systems, petruha.smirnov.1994@gmail.com

Post-Graduate Students

Irina V. Vatamaniuk - Methods and software tools for analysis of the significance of audiovisual information flows in multimodal interfaces of robotic and information management systems (supervised by Professor Andrey L. Ronzhin), vatamaniuk@iias.spb.su

Alexander V. Denisov - Methods and software tools for the motion control of robot with anthropomorphic kinematics (supervised by Professor Andrey L. Ronzhin), denisov@iias.spb.su

Vitaliy S. Gaponov - Methods of coordinated network management and embedded software for robotic system actuators (supervised by Cand. Tech. Sci. Vladimir P. Dashevsky), gaponov@iias.spb.su
Arseniy G. Ivin – Mathematical models, algorithms and software for implementing combined movements of anthropomorphic robots (supervised by Professor Andrey L. Ronzhin), arssivka@yandex.ru
Daniil I. Michalchenko – Algorithms and software for decision making based on sensory systems data of anthropomorphic robots (Cand. Tech. Sci. Viktor Yu. Budkov), tekatodsham@gmail.com
Dmitriy A. Malov – Architectures, algorithms and software of self-organizing technical systems (supervised by Cand. Tech. Sci. Vladimir P. Dashevsky), malovdmitrij@gmail.com
Nikita Pavliuk – Software tools and structural-functional models of network interaction of nodes of anthropomorphic robots (supervised by Professor Andrey L. Ronzhin), antei.hasgard@gmail.com

Grants and Projects

Ronzhin A.L. – RSF Project No. 16-19-00044 “Principles of the tasks allocation between service robots and means of cyber-physical intelligent environment for the multimodal user support", 2016-2018.
Budkov V.Yu. – RFBR Project No. 17-58-04110_Bel_mol_a_dk “Modeling and development of energy-efficient solutions for kinematics and dynamics of walking robots”, 2017-2019.
Budkov V.Y. – RFBR Project No. 16-37-60085-mol_a_dk “Development of methods and software for estimating deception of transmitted voice messages», 2016-2019.
Ronzhin A.L. – RFBR Project No. 16-29-04101 “Techniques for controlling pairwise linkages of homogeneous robots when configuring a robotic swarm into three-dimensional forms”, 2016-2018.
Ronzhin A.L. – RFBR Project No. 16-08-00696 «Modeling of automated robotic means for transporting victims", 2016-2018.
Ronzhin A.L. – Project No. 0073-2015-0001 “Group control of mobile robots in the intelligent space", Program of the RAS Presidium I.40P "Current problems of robotics", 2015-2017. (jointly with the Laboratory of Integrated Automation Systems headed by Dr. Tech. Sci. Smirnov, A.V.).
Budkov V.Y. – Grant of the President of the Russian Federation No. MK-7925.2016.9 “Mathematical and programming software for evaluating speech truthfulness”, 2016-2017.

University Courses

SPSUAI: "Local control systems"; "Neural networks and neural controllers"; "Robots and robotic systems control"; "Optimal Systems" (A.Saveliev, A. Ronzhin, N. Pavliuk).

Conferences

7th Interdisciplinary Seminar "Analysis of Conversational Russian Speech" (AP3-2017), St. Petersburg, January 20, 2017 – V. Budkov.

6th International Conference On Advanced Infotelecommunication (ICAIT 2017), St. Petersburg, March 01-02, 2017 – A. Ivin, D. Michalchenko.

2nd military-scientific conference "Robotics for the Armed Forces of the Russian Federation", Moscow, March 23, 2017 – A. Ronzhin.

20 FRUCT Conference (Finnish-Russian University Cooperation in Telecommunications), St. Petersburg, April 03-07, 2017 – A. Ivin, D. Michalchenko.

Russian-German seminar "Robotics, Automation and Biomechanics", St. Petersburg, April 04-05, 2017 – A. Ronzhin.

III Practical Conference on Robotics – RoboSector 2017, Moscow, April 11, 2017 – A. Ronzhin.

International Scientific-Technical Conference "Zavalishinskie chteniia - 2017", St. Petersburg, April 18-22, 2017 – R. Iakovlev, A. Denisov, V. Dashevskiy, A. Ronzhin.

International conference Skolkovo Robotics V, Moscow, April 21, 2017 – A. Ronzhin.

National competition RoboCup Russia Open 2017, Tomsk, May 17-19, 2017 – A. Ivin, D. Michalchenko, A. Ronzhin.

2017 International Conference on Mechanical, System and Control Engineering (ICMSC 2017), St. Petersburg, May 19-21, 2017 – V. Gaponov.

XXX International Scientific Conference "Mathematical Methods in Engineering and Technology", St. Petersburg, May 30 - June 2, 2017 – M. Kuzov, D. Malov.

10th All-Russian Multiconference on Control Issues, v. Divnomorskoe, Gelendzhik, September 11 - 16, 2017 – D. Malov, N. Pavliuk, A. Ronzhin.

19th International Conference on Speech and Computer (SPECOM 2017), Hatfield, Hertfordshire, United Kingdom, September 12 - 16, 2017 – V. Budkov.

The 2nd International Conference on Interactive Collaborative Robotics (ICR-2017), Hatfield, Hertfordshire, United Kingdom, September 12 - 16, 2017 – I. Vatamaniuk, A. Ronzhin.

4th All-Russian Scientific and Practical Seminar "Unmanned Vehicles with Artificial Intelligence Elements", Kazan, Republic of Tatarstan, October 5-6, 2017 – A. Ronzhin.

International Scientific and Technical Conference "Extreme Robotics (ER-2017)", St. Petersburg, November 2 - 3, 2017 – N. Pavliuk, M. Kuzov, I. Vatamaniuk, A. Ronzhin.

5th IEEE Workshop on advances in information, electronic and electrical engineering, Riga, Latvia, November 24-25, 2017 – A. Ronzhin.

Jubilee readings in honor of the 95th anniversary of Professor R.G. Piotrovsky, St. Petersburg, November 27, 2017 – A. Ronzhin.

Thailand Robotics Week 2017 & RoboCup Asia-Pacific 2017, Bangkok, Thailand, December 14-17, 2017 – N. Pavliuk, A. Ivin, D. Michalchenko, V. Budkov, A. Ronzhin.

Research Management

Organization of the 19th International Conference "Speech and Computer» SPECOM-2017. http://specom.nw.ru/. Hatfield, Hertfordshire, United Kingdom, September 12 - 16, 2017 – A. Ronzhin (co-chair), http://specom.nw.ru/. Proceedings published: Speech and Computer. Springer International Publishing Switzerland. A. Karpov et al. (Eds.): SPECOM 2017, LNAI 10458, 2017, 831 p. http://www.springer.com/gb/book/9783319664286.

Organization of the 2st International Conference "Interactive Collaborative Robotics» ICR-2017. http://specom.nw.ru/icr. Hatfield, Hertfordshire, United Kingdom, September 12 - 16, 2017 – A. Ronzhin (co-chair). Proceedings published: Interactive Collaborative Robotics - Springer International Publishing Switzerland. A. Ronzhin et al. (Eds.): ICR-2017, LNAI 10459, 2017, 288 p. http://www.springer.com/kr/book/9783319664705.

International Cooperation

Joint research and organization of scientific events in collaboration with the University of West Bohemia in Pilsen (Czech Republic), Bogazici University in Istanbul (Turkey), Dresden University of Technology (Germany), Belarusian State University of Informatics and Radioelectronics (Belarus), United Institute of Information Problems of the National Academy of Sciences of Belarus, Universidad Nacional Autonoma de Mexico (Mexico).

Membership in Domestic and International societies, editorial boards, etc.

Ronzhin A.L. – RAS expert; member of the Scientific Council on Robotics and Mechatronics of the Russian Academy of Sciences; member of the sub-committee on Eastern Europe of the International Speech Communication Association (ISCA); member of the Academy of Navigation and Motion Control; General Conference Co-Chair of the International Conference “Speech and Computer” SPECOM; Co-Chair of the international conference "Interactive Collaborative Robotics" ICR; Editorial Board Member of Journal “Speech Technology”; Deputy Chief Editor of Journal «SPIIRAS Proceedings»; member of the Higher Attestation Commission Expert Council on Informatics, Management and Computer Science.

Intellectual Property Registered in the Reporting Year

Certificate of state registration of the database No.2017620356 from 29.03.2017: V. Budkov, A. Saveliev “Corpus of Russian speech to investigate the truth of transmitted messages”.

Patent for invention No.2638003 from 08.12.2017: A. Ronzhin, A. Saveliev "Method of distributing tasks between service robots and cyber-intellectual space resources while multimodal user servicing".

Recent Results

1. Heuristic method of inverse kinematic problem solving with processing of restrictions on allowable relative position of individual links for manipulators positioning was developed. This method allows to arrange an end node of robotic system with an error of up to 0.02 cm, which means it's possible to use this method in a real robotic system [5].
2. Design model and a full-scale prototype of anthropomorphic robot Antares, using a flange support with an elastic coupling for internal dilution of wired connections and reducing the load on the axial drives of the pedipulators was developed. Also, the robot's torso, as a basic unit, have been developed, which includes the main computational modules and mounting attachments for the installation head module for obtaining audiovisual information [2].
3. Gripping device, that allows to compensate the external load on the actuator was developed. Also, the primary model of the clavicle and shoulder mechanisms of the robot for the anthropomorphic robot Antares [33].
4. Prototype of the electromagnetic mechanism for modular robots connecting, based on ferromagnetic materials, with control system, based on applying voltage to the clipping coil and reversing the polarity of the applied voltage was developed [20].
5. Architecture of computing self-similar systems on the module based on the printed circuit boards of mezzanine type, which is characterized by the possibility of capacity expansion by connecting without additional motherboards was developed. This architecture is used at the stage of prototyping of new systems and for upgrading existing specialized computers [34].
6. High-performance modular multithreaded data exchange system based on non-blocking algorithms for cross-thread synchronization and serialization of data without copying, with the use of thread-safe non-blocking queues of functors, which increased performance at 6-8 times compared to the use the Boost Signals2 library and applicable for creating high-performance multithreaded modular robotic systems was developed [23].
7. Modification of the traditional method for state machine designing, based on the use of probabilities that evaluate environmental events was conducted. Also, the application of machine learning methods in

combination with modified state machine have allowed to implement a framework for robotic platform's decision making [23].

8. Multilevel model of integrating the components of the corporate informational infrastructure into the developing cyber physical intellectual space, and formalization of scenarios for the functioning of intellectual space based on the temporal logic of actions was proposed. Also, client and server software for corporate television and video conferencing services management have been developed [14].
9. A novel approach to the management of audio and video streams in peer-to-peer applications is proposed, which allows to form connection between videoconferencing participants via «one-to-many» WebRTC technology, using the mechanism of combining several media streams into the one (multimedia stream mixing) [35].
10. Universal approach to the organization of IoT-networks using hybrid modules was developed. This approach provides flexibility, scalability, energy efficiency and universal configuration and operation of the network for transmitting several types of multimedia data using Bluetooth and Wi-Fi technologies. This approach takes into account the software and hardware features of data transmission devices in IoT-networks, which makes it possible to automate the communication process of user-selected modules [35].

Awards

A. Saveliev, A. Ivin, D. Mikhalchenko, A. Ronzhin (Aerospace Bruisers team) — diploma for the first place in the league of humanoid robots RoboCup Humanoid Soccer KidSize League in the robotics championship «RoboCup Russia Open — 2017».

A.L. Ronzhin - Laureate of the St. Petersburg Government Prize for outstanding scientific results if the field of science and technology in 2017 in the nomination of electrical and radio engineering, electronics and information technology – A. Popov's award: for a series of works on the development of multimodal systems of the surrounding intellectual space.

References

Papers published in journals and editions indexed by WoS, Scopus

1. Shlyakhov N.E., Vatamaniuk I.V., Ronzhin A.L. Survey of Methods and Algorithms of Robot Swarm Aggregation. IOP Conf. Series: Journal of Physics: Conf. Series 803 (2017) 012146. DOI:10.1088/1742-6596/803/1/012146.
2. Kodyakov A.S., Pavlyuk N.A., Budkov V.Yu., Prakapovich R.A. Stability Study of Anthropomorphic Robot Antares under External Load Action. IOP Conf. Series: Journal of Physics: Conf. Series 803 (2017) 012074. DOI:10.1088/1742-6596/803/1/012074.
3. Gaponov V., Dashevsky V., Ronzhin A. Upgrading the Hardware and Software of RC Servos for Use in Educational Robotics. IEEE

International Conference on Mechanical, System and Control Engineering, 2017, pp. 235-239. DOI: 10.1109/ICMSC.2017.7959478.
4. Iakovlev R., Sakuta V., Denisov A., Prakapovich R., Improving energy efficiency of a robotic system based on multiple analytical solutions for inverse kinematics. 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017, MATEC Web of Conferences, vol. 113, 02002 (2017). DOI: 10.1051/matecconf/201711302002.
5. Denisov A., Iakovlev R., Mamaev I., Pavliuk N., Analysis of balance control methods based on inverted pendulum for legged robots. 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017, MATEC Web of Conferences, vol. 113, 02004 (2017). DOI: 10.1051/matecconf/201711302004.
6. Shlyakhov N., Dashevskiy V., Vatamaniuk I., Zelezny M., Ronzhin A., Justification of the technical requirements of a fully functional modular robot**.** 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017, MATEC Web of Conferences, vol. 113, 02008 (2017). DOI: 10.1051/matecconf/201711302008.
7. Saveliev A., Malov D., Tamashakin M., Budkov V., Service and multimedia data transmission in IoT networks using hybrid communication devices. 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017, MATEC Web of Conferences, vol. 113, 02010 (2017). DOI: 10.1051/matecconf/201711302010.
8. Nguyen V., Vu Q., Solenaya O., Ronzhin A. Analysis of main tasks of precision farming solved with the use of robotic means. 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017, MATEC Web of Conferences, vol. 113, 02009 (2017). DOI: 10.1051/matecconf/201711302009.
9. Ivin A., Mikhalchenko D. Software Platform for Development of Multimodular Robotic Systems with Asynchronous Multithreaded Control. Proceedings of the FRUCT'20, Saint-Petersburg, Russia, 3-7 April 2017, pp. 105-111.
10. Levonevskiy D., Vatamaniuk I., Saveliev A. Integration of Corporate Electronic Services into a Smart Space Using Temporal Logic of Actions.International Conference on Interactive Collaborative Robotics. – Springer, Cham, 2017. LNAI 10459. – pp. 134-143. DOI: https://doi.org/10.1007/978-3-319-66471-2_15.
11. Dashevskiy V., Budkov V., Ronzhin A. Survey of Modular Robots and Developed Embedded Devices for Constructive and

Computing Components.International Conference on Interactive Collaborative Robotics. – Springer, Cham, 2017. LNAI 10459. – pp. 50-58. DOI: 10.1007/978-3-319-66471-2_6.
12. Vu Q., Nguyen, V., Solenaya, O., Ronzhin, A. Group Control of Heterogeneous Robots and Unmanned Aerial Vehicles in Agriculture Tasks.International Conference on Interactive Collaborative Robotics. – Springer, Cham, 2017. LNAI 10459. – pp. 260-267. DOI: https://doi.org/10.1007/978-3-319-66471-2_28.

Papers published in Russian journals and editions indexed by RCSI

13. Shlyakhov N.E., Vatamaniuk I.V., Ronzhin A.L. , Review of the Methods and Algorithms of a Robot Swarm Aggregation. Mekhatronika, avtomatizatsiya, upravleniye. 2017. vol. 18. no. 1. pp. 22-29. DOI: 10.17587/mau.18.22-29.
14. Levonevskiy D.K., Vatamaniuk I.V., Saveliev A.I. MINOS Multimodal Information and Navigation Cloud System for the Corporate Cyber-Physical Smart Space. Programmnaya Inzheneriya. 2017. No. 3. pp. 120-128. DOI: 10.17587/prin.8.120-128.
15. Kodyakov A.S., Pavliuk N.A., Budkov V. Yu. Study of Stability of Antares Anthropomorphic Robot under the Action of an External Load. Mekhatronika, avtomatizatsiya, upravleniye. 2017. vol.18. no. 5. pp. 321-327. DOI: 10.17587/mau.18.321-327.
16. Vu D.Q., Nguyen V.V., Solenaya O.Ya., Ronzhin A.L. Survey of Precision Farming Tasks and Agricultural Robotic Tools. Izvestiya Kabardino-Balkarskogo nauchnogo tsentra RAN, 2017, no. 3 (77), pp.13-19.
17. Vu D.Q., Nguyen V.V., Solenaya O. Ya., Ronzhin A.L. Analysis of Agricultury Robotics Tasks Solved by Using Unmanned Aerial Vehicles. Agrofizika. 2017. no. 3. pp. 57-65.
18. Ngo Q., Solenaya O., Ronzhin A.L. Analysis of mobile robotic platforms used to batteries service of unmanned aerial vehicles in autonomous missions. Trudy MAI. 2017. №95. URL: http://trudymai.ru/published.php?ID=84444
19. Konson Yu.A., Ronzhin A.L. Industrial optimization of modern human and robot interaction. Sovremennyye informatsionnyye tekhnologii. Teoriya i praktika. Materialy III Vserossiyskoy nauchno-prakticheskoy konferentsii. Pod red. T.O. Petrovoy. 2017. pp. 23-29.
20. Smirnov P.A., Kuzov M.Y., Pavliuk N.A. Development of modular reconfiguring manipulator. Sovremennyye informatsionnyye tekhnologii. Teoriya i praktika. Materialy III Vserossiyskoy nauchno-prakticheskoy konferentsii. Pod red. T.O. Petrovoy. 2017. pp. 35-40.
21. Basov O.O., Bondareva N.V., Budkov V.Y. A specialized speech database for evaluating the truth of transmitted information in a

speech stream. Sovremennyye informatsionnyye tekhnologii. Teoriya i praktika. Materialy III Vserossiyskoy nauchno-prakticheskoy konferentsii. Pod red. T.O. Petrovoy. 2017. pp. 254-256.
22. Motienko A.I., Basov O.O., Bizin M.M. Decision support system for rescuing people injured as a result of accidents at hazardous production facilities. Nauchnyy vestnik NGTU. vol. 67. no. 2. 2017. pp. 65–82. DOI: 10.17212/1814-1196-2017-2-65-82.
23. Ivin A.G., Mikhalchenko D.I. High-performance modular multithreaded data exchange system for robotic complexes. Informatsionnyye tekhnologii i telekommunikatsii. 2017. vol. 5. no. 2. pp. 74-84.
24. Mikhalchenko D.I., Ivin A.G. Probabilistic method for constructing a state machine for the decision module in robotic systems. Informatsionnyye tekhnologii i telekommunikatsii. 2017. vol. 5. no. 2. pp. 85-96.
25. Denisov A.V., Yakovlev R.N. Methods for ensuring the stability of the movement of an anthropomorphic robot on the basis of an inverse pendulum. Zavalishinskiye chteniya’17: sb. dokl. / SPb.: GUAP, 2017. pp. 227-231.
26. Smirnov P.A., Kuzov M. Yu., Pavlyuk N.A. Development of manipulator model with variable kinematic chain. Zavalishinskiye chteniya’17: sb. dokl. / SPb.: GUAP, 2017. pp. 232–235.
27. Ronzhin A.L., Dashevskiy V.P., Bizin M.M. Technological foundations for managing pairwise connections in a swarm of modular robots. Materialy 10-y Vserossiyskoy mul'tikonferentsii MKPU-2017. vol. 2. Robototekhnika i mekhatronika. pp. 306-308.
28. Pavlyuk N.A., Kuzov M.A., Smirnov P.Yu. Pelvic mechanism of the antromorphous robot Antares on the flange support with an elastic coupling. Materialy 10-y Vserossiyskoy mul'tikonferentsii MKPU-2017. vol. 2. Robototekhnika i mekhatronika. pp. 42-44.
29. Motienko A.I., Ronzhin A.L., Altunin A.A., Kryuchkov B.I., Evacuation of an astronaut in a spacesuit during out-of-ship activities on the surface of the moon with the participation of rescue robots. Mechatronics, automation, management. Mekhatronika, avtomatizatsiya, upravleniye. 2017. vol. 18. no. 11. pp. 734-739.
30. Yakovlev R.N., Denisov A.V. A method for processing the constraints of manipulator nodes in the iterative solution of the inverse kinematics problem. Fundamental'nyye i prikladnyye problemy tekhniki i tekhnologii. 2017. vol. 326. no. 6. pp. 76-84.
31. Vu D.K., Solenaya O.Ya., Ronzhin A.L. Overview of robotic grippers for physical manipulation of agricultural products. Traktory i sel'khozmashiny. no.12. 2017.
32. Solenaya O.Ya., Ngo K.T., Ronzhin A.L. Analysis of requirements and limitations of mobile electromechanical systems for servicing

accumulators of unmanned aerial vehicles. Voprosy elektromekhaniki. Trudy VNIIEM, vol. 157. no. 2. 2017.
33. Pavliuk N.A., Smirnov P.A. Modeling and optimization of the frame elements of the torso and the pelvic mechanism of the anthropomorphic robot ANTARES. Izvestiya Yugo-Zapadnogo gosudarstvennogo universiteta. Seriya tekhnika i tekhnologii. vol. 7. no. 4(25).
34. Dashevskiy V.P., Budkov V.Yu. Architecture of SIM-SIM network interface with support for distributed modules. Informatsionnyye tekhnologii i telekommunikatsii. vol. 5. no. 4. 2017.
35. Karasev E.Yu., Savelyev A.I., Malov D.A. Managing audio and video streams in peer-to-peer videoconferencing applications. Materialy 10-y Vserossiyskoy mul'tikonferentsii MKPU-2017, vol. 3. Upravleniye v raspredelennykh i setevykh sistemakh. 2017. pp. 94-96.
36. Wu D.K., Nguyen V.V., Ngo K.T., Ronzhin A.L. Modeling the processes of interaction of heterogeneous agrobots. Trudy Vos'moy vserossiyskoy nauchno-prakticheskoy konferentsii «Imitatsionnoye modelirovaniye. Teoriya i praktika» (IMMOD-2017). SPb.: Izd-vo VVM. 2017. pp. 337-342.
37. Ronzhin A.L., Wu D.K., Nguyen V.V., Solenaya O.Ya. Conceptual and algorithmic models for the joint operation of a robotic platform and a set of UAVs for performing agrarian operations. Chetvertyy Vserossiyskiy nauchno-prakticheskiy seminar «Bespilotnyye transportnyye sredstva s elementami iskusstvennogo intellekta» (BTS-II-2017). pp. 183-192.

Other Publications

38. Ronzhin A.L. Dashevsky V.P. Tasks and perspectives of group interaction in modular, swarm and cloud robotics. Trudy vtoroy voyenno-nauchnoy konferentsii «Robotizatsiya Vooruzhennykh Sil Rossiyskoy Federatsii», Moskva. 2017. pp. 60-70.
39. Pavliuk N.A. Simulation of the supporting structure of the pelvic mechanism of anthropomorphic robot Antares. Sbornik tezisov Mezhdunarodnoy nauchno-tekhnicheskoy konferentsii «Ekstremal'naya robototekhnika». 2017. pp. 70-71.
40. Vatamaniuk I.V., Savelev A.I. Mobile robotic platform as a component of cyber physics intellectual space. Sbornik tezisov Mezhdunarodnoy nauchno-tekhnicheskoy konferentsii «Ekstremal'naya robototekhnika». 2017. pp. 34-35.
41. Motienko A.I., Ronzhin A.L., Altunin A.A., Kryuchkov B.I., Usov V.M. Evacuation of an astronaut in a spacesuit during out-of-ship activities on the surface of the moon with the participation of rescue robots. Sbornik tezisov Mezhdunarodnoy nauchno-tekhnicheskoy konferentsii «Ekstremal'naya robototekhnika». 2017. pp. 170-171.

Laboratory of Biomedical Informatics

Head of the Laboratory: Dr. Tech. Sci. Sergey B. Roudnitsky – distance biometry, chronobiology, integrated signal processing, radio navigation; sbr@spiiras.ru

Laboratory Staff – 8 members.

Research Activities

Development and research into new information technologies and hardware & software tools for processing electrophysiological signals and data mining of clinical & experimental data for biomedical diagnosis systems, functional state monitoring and clinical decision support.

Research Fellows and Summary of Research Topics

Leading researcher Dr. Tech. Sci. Vyacheslav A. Duke – methods of data analysis in knowledge domains with complex system structure. v_duke@mail.ru

Senior researcher Cand. Phys. - Math. Sci. Elena A. Popova – development of mathematical models; numerical experiments in biotechnical systems. eap@spiiras.ru

Senior researcher Cand. Med. Sci. Evgeniy L Wasserman. – research of human brain electric activity; design of psychophysiological testing systems; polygraphy; medical informatics as an academic discipline. ewasser@ev7987.spb.edu

Researcher Nikolay K. Kartashev– study of human brain electric activity; study of safe computing environment design problems; design of psychophysiological testing systems; polygraphy; telemedicine.

Researcher Oleg.V. Zhvalevsky– mathematical processing of biometric data; design of automation software; software application integration. ozh@spiiras.ru

Researcher Darjya M. Denisova– investigations in human emotional sphere; design of psychological modelling methods of emotion-inducing situations; psychophysiology of stress; survival-oriented behaviour. dendm@spiiras.ru

University courses

Herzen State Pedagogical University of Russia, Institute of Computer Science and Technological Education, Department of Computer Engineering and Software Development: “Methods and models of analysis and synthesis of information systems”, “Intellectual information systems and technologies” (V.A.Duke)

Herzen State Pedagogical University of Russia, Institute of Special Education and Rehabilitation, Department of Principles of Special Education: “Information technology in psychological and educational rehabilitation of disabled people”, “Child neurology”, “Psychopathology with a clinical picture of intellectual disorders” (E.L.Wasserman).

Saint Petersburg State University, School of Medicine, Department of Healthcare Management and Medical Law: “Informatics”, “Medical informatics” (E.L.Wasserman).

Conferences

The Eighth All-Russian Scientific-Practical Conference on Simulation and its Application in Science and Industry “Simulation. Theory and Practice” (IMMOD-2017), October 18-20, 2017, Saint Petersburg, Russia — Zhvalevsky O.V., Roudnitsky S.B.

Fourth International Conference on Advances in Biomedical Engineering, ICABME 2017, October 19-21, 2017, Hadath, Beirut, Lebanon — Wasserman E.L., Zhvalevsky O.V., Kartashev N.K., Roudnitsky S.B.

2nd Russian-Pacific Conference on Computer Technology and Applications (RPC 2017), September 25-29, Vladivostok, Russia. — Wasserman E.L., Zhvalevsky O.V., Kartashev N.K., Roudnitsky S.B.

VIII international conference “Solar-Terrestrial Relations and Physics of Earthquake Precursors”, September 25-29, 2017, Paratunka, Kamchatskii krai, Russia — Duke V.A.

IV International Scientific-Methodical Conference “Modern Educational Technologies in Teaching Natural Sciences and Humanities Courses”, April 11–12, 2017, Saint Petersburg, Russia — Popova E.A.

Membership in Domestic and International societies, editorial boards, etc.

Sergey B. Roudnitsky – RAS expert (ID # 2016-01-2675-2205); expert of Ministry of education and science of Russian Federation (Directorate of State Scientific and Technical Programs), expert of the development fund of the Center for the development and commercialization of advanced technologies “Skolkovo”, member of specialized thesis committee at JSC “VNIIRA” of JSC Concern VKO “Almaz-Antey” DS 409.016.01 VNIIRA.

Vyacheslav A. Duke – editorial board member of the theoretical and practical journal “Clinico-Laboratory Council”, member of the board of administration of the regional department of Russian Association of Medical Laboratory Diagnostics.

Intellectual Property Registed in the Reporting Year

Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky y S.B. Software for synchronous recording and processing of multimodal signals “LBMI-001M” (Certificate of state registration of software №2017613933, date of state registration: April 04, 2017).

Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for database management for the LBMI-001M program (Certificate of state registration of software №2017613935, date of state registration: April 04, 2017).

Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for interaction with hardware for the LBMI-001M pro-

gram (Certificate of state registration of software №2017613937, date of state registration: April 04, 2017).

Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for performing experiments for the LBMI-001M program (Certificate of state registration of software №2017613939, date of state registration: April 04, 2017).

Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for data processing and decision making for the LBMI-001M program (Certificate of state registration of software №2017613940, date of state registration: April 04, 2017).

Recent Results

1. A statistical investigation of clinical and experimental data has shown a significant correlation between the onset and/or worsening of cardiac pathology in cancer patients with signs of cachexia and low 6-COMT level. It has been established that the total index of cardiac disorders in cancer patients rises proportionately to the progress in cachexia severity [1].
2. A hypothesis on the relationship between acoustic and electromagnetic phenomena caused by seismic activity of the Earth's crust has been explored. An informational approach suggested for regularity detection in these signals consists of revealing links between phenomena by highlighting the sequences of interrelated events. The events are understood as fixed-time changes in the characteristics of signals undergoing analysis. Records are made of the objects that are retrospectively linked to a certain fact of a confirmed seismic phenomenon. The set of recorded objects undergoes linguistic processing, and clusters of objects with similar linguistic structure are formed as a result of this processing [8].
3. A method of transforming acoustic signals into an informational message has been developed. This method is based on the detection of repeating self-similar templates. Features for highlighting the events in symbolic sequences that represent acoustic signals have been defined. Processing the acoustic signals with the linguistic analysis program has yielded results. The advantages and disadvantages of all the applied algorithms have been analyzed [2].
4. Approaches for performing of integrated physiological research using information and measurement systems by different manufacturers have been analyzed and systematized. Parallels to the trending technology of medical cyber-physical systems have been drawn. Introduced abstraction levels and suggested self-designed flexible architecture of software and hardware systems provide solutions for a number of challenges that arise in physiological and medical research [3, 9–13].
5. The solution for automation of medical and biological research by means of automated designing and implementation of software and hardware systems has been substantiated. The methodology for creating such systems requires the development of simulation models for all

the processes subject to automation as well as the very processes and phenomena that are being researched. The software implementation of this methodology requires an approach based on the use of hardware and software configurations [5, 9–13].

6. Challenges of automation of Parkinson's disease diagnosis have been analyzed. The necessity of building a multilevel detection system that uses separate models and algorithms on every level has been substantiated. The event-based time series generation model is necessary to choose optimally fitting methods of time series processing that are capable of identifying potentially informative features. The multiring control model, in its turn, is necessary to identify microstates in an optimal way. The macrostate model is necessary to set the models of underlying levels optimally and unite them with an external quality criterion [6].

References

Papers Published in Editions Indexed by WoS, Scopus

1. Balluzek M.F., Mashkova M.V., Arutyunyan A.V., Duke V.A. Melatonin as a marker of intensity of cardiological disorders at the stages of cachexia syndrome development in cancer patients of various ages. Uspekhi gerontologii. 2017. Vol. 130. № 1. P. 70–77.
2. Senkevich Y.I., Duke V. A., Mishchenko M., Solodchuk A. Informational approach to the analysis of acoustic signals / E3S Web of Conferences 20, 02012 (2017).
3. Wasserman E.L., Kartashev N.K., Roudnitsky S.B., Zhvalevsky O.V. Aggregation, integration, or full-fledged cyber-physical system? Way of researcher in biomedicine.. Fourth International Conference on Advances in Biomedical Engineering (ICABME 2017). P. 9–12.

Papers Published in Russian Editions Indexed by RSCI

4. Ivantsevich N.V., Roudnitsky S.B. The complexation of consumer hardware in the integrated system of satellite and inertial navigation. Voprosy radioelektroniki. 2017. № 7. P. 29–34.
5. Zhvalevsky O.V., Roudnitsky S.B. Simulation modeling for medical and biological research. The Eight All-Russia Scientific-Practical Conference on Simulation and its Application in Science and Industry "Simulation. Theory and Practice" (IMMOD-2017), Russia, Saint Petersburg, October 18–20, 2017: proceedings of the conference. Saint Petersburg, 2017. P. 384–388.
6. Zhvalevsky O.V. Automation of Parkinson's disease diagnosis: problem statement. The Eight All-Russia Scientific-Practical Conference on Simulation and its Application in Science and Industry "Simulation. Theory and Practice" (IMMOD-2017), Russia, Saint Petersburg, October 18–20, 2017: proceedings of the conference. Saint Petersburg, 2017. P. 379–383.
7. Mansurova S.E., Popova E.A. Internet-based Technology Using by a Teacher. IV International Scientific-Methodical Conference

"Modern Educational Technologies in Teaching Natural Sciences and Humanities Courses". 2017. P. 339–344.
8. Senkevich Yu.I., Mishchenko M.A., Larionov I.A., Solodchuk A.A., Duke V.A. An informational approach to the analysis of acoustic and electromagnetic signals. Solar-Terrestrial Relations and Physics of Earthquake Precursors: Book of abstracts of VIII international conference. Petropavlovsk-Kamchatsky, 2017. P. 50–51.

Other publications

9. Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Software for synchronous recording and processing of multimodal signals "LBMI-001M". Programmy dlya EVM. Bazy dannykh. Topologii integral'nykh mikroskhem: Ofitsial'nyi byulleten' Federal'noi sluzhby po intellektual'noi sobstvennosti (Rospatent). 2017, №4. №2017613933. URL: http://www1.fips.ru/fips_servl/fips_servlet?DB=EVM&rn=1508&DocNumber=2017613933&TypeFile=html (accessed on 25.04.2017).
10. Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for database management for the LBMI-001M program. Programmy dlya EVM. Bazy dannykh. Topologii integral'nykh mikroskhem: Ofitsial'nyi byulleten' Federal'noi sluzhby po intellektual'noi sobstvennosti. 2017, №4. №2017613935. URL: http://www1.fips.ru/fips_servl/fips_servlet?DB=EVM&rn=1508&DocNumber=2017613935&TypeFile=html (accessed on 25.04.2017).
11. Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for interaction with hardware for the LBMI-001M program. Programmy dlya EVM. Bazy dannykh. Topologii integral'nykh mikroskhem: Ofitsial'nyi byulleten' Federal'noi sluzhby po intellektual'noi sobstvennosti. 2017, №4. №2017613937. URL: http://www1.fips.ru/fips_servl/fips_servlet?DB=EVM&rn=1508&DocNumber=2017613937&TypeFile=html (accessed on 25.04.2017).
12. Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for performing experiments for the LBMI-001M program. Programmy dlya EVM. Bazy dannykh. Topologii integral'nykh mikroskhem: Ofitsial'nyi byulleten' Federal'noi sluzhby po intellektual'noi sobstvennosti. 2017, №4. №2017613939. URL: http://www1.fips.ru/fips_servl/fips_servlet?DB=EVM&rn=1508&DocNumber=2017613939&TypeFile=html (accessed on 25.04.2017).
13. Zhvalevsky O.V., Wasserman E.L., Kartashev N.K., Roudnitsky S.B. Module for data processing and decision making for the LBMI-001M program. Programmy dlya EVM. Bazy dannykh. Topologii integral'nykh mikroskhem: Ofitsial'nyi byulleten' Federal'noi sluzhby po intellektual'noi sobstvennosti. 2017, №4. №2017613940. URL: http://www1.fips.ru/fips_servl/fips_servlet?DB=EVM&rn=1508&DocNumber=2017613940&TypeFile=html (accessed on: 25.04.2017).

Laboratory of Computer Aided Integrated Systems

Head of the Laboratory: Dr.Tech. Sci., Professor, Honored Scientist of the Russian Federation Alexander V. Smirnov – intelligent configuration management of virtual & networked organizations and knowledge logistics, smir@iias.spb.su; http://cais.iias.spb.su

Laboratory Staff – 14 members, and 1 post-graduate student.

Research Activities

Methods and technologies for knowledge logistics and intelligent management of virtual resource networks.

Research Fellows

Senior researcher Cand. Tech. Sci. Alexey M. Kashevnik – methods and technologies for knowledge management in intelligent environments. alexey@iias.spb.su

Senior researcher Cand. Tech. Sci. Tatiana V. Levashova – methods and technologies for ontology management. tatiana.levashova@iias.spb.su

Senior researcher Cand. Tech. Sci. Michael P. Pashkin – Internet-based technologies for group decision support. michael@iias.spb.su

Senior researcher Cand. Tech. Sci. – Andrew V. Ponomarev – methods and technologies for complex decision support. ponomarev@iias.spb.su

Senior researcher Cand. Tech. Sci. Sergey V. Savosin – methods and information technologies for business process management.

Senior researcher Cand. Tech. Sci. Oksana V. Smirnova - methods and information technologies for ontology-oriented decision support, sov@oogis.ru

Senior researcher Cand. Tech. Sci., Associate Professor Nikolai G. Shilov – models and methods for networked organization configuration. nick@iias.spb.su

Senior researcher Cand. Tech. Sci., Associate Professor Vladimir M. Shpakov - hybrid dynamic system modelling and simulation. vlad@iias.spb.su

Senior researcher Cand. Tech. Sci. Nikolai N. Teslya – technologies for smart spaces. teslya@iias.spb.su

Researcher MS Maxim S. Shchekotov – mobile services and social media technologies. shekotov@iias.spb.su

Junior reseacher MS Igor B. Lashkov - technologies for dangerous situations prevention of vehicles based on mobile video measurements of driver behavior, igor-lashkov@ya.ru

Junior reseacher MS Sergey A. Mikhailov - technologies for context-driven proactive decision support, mikhaylovsergeyandreevich@gmail.com

Junior reseacher MS Mikhail V. Petrov – technologies for ontology-oriented competence management, dragon294@mail.ru

Defense of Thesis

Strahov, I. «Worktime Tracking Automation with Usage of Alternative Information Sources», Master Degree, 09.04.02 – Information Systems and Technologies (St.Petersburg State Electrotechnical University "LETI", supervised by Nikolai G. Shilov).

Osipkov A. «Infomobile Driver Support System for Parking Spot Searching", Master Degree, 09.04.02 – Information Systems and Technologies (St.Petersburg State Electrotechnical University "LETI", supervised by Nikolai G. Shilov).

Kozemerchak E. «Increasing Performance of a Computer Game Client Application Based on a 3D Software Development Tool", Master Degree, 09.04.02 – Information Systems and Technologies (St.Petersburg State Electrotechnical University "LETI", supervised by Nikolai G. Shilov).

Mikhailov S. «Development of the Management System for Mobile Robots Collaborative Scenarios in Smart Spaces Based on Smart-M3 Platform and DD-WRT Operation System», Master Degree, 38.05.04 – Business Information Systems (ITMO University, supervised by Alexey M. Kashevnik).

Mironov M. «Development of Smartphone-based Adaptive Remote Control Interface for Multicomponent UGV Developed in „ROCAD" Scientific and Technical Center», Master Degree, 38.05.04 – Business Information Systems (ITMO University, supervised by Alexey M. Kashevnik).

Petrov M. «Ontology-based Indirect Interaction of Users and "ROCAD" Company's Mobile Robots for Joint Activities», Master Degree, 38.05.04 – Business Information Systems (ITMO University, supervised by Alexey M. Kashevnik

Grafkin P. "Principles for Designing an Effective Recommendation Support for Business Intelligence Systems", Master Degree, 38.05.04 – Business Information Systems (ITMO University, supervised by Andrew V. Ponomarev).

Grants and Projects

Smirnov A., Shilov N. – Intelligent Content Management for on-Demand Personalized Tours in Smart Destinations (Ford Motor Company, USA, 2017-2019).

Smirnov A., Ponomarev A. – Methods and Models for Intelligent Decision Support Based on Human-Computer Cloud (the Russian Science Foundation, 2016-2018 – Grant No. 16-11-10253).

Teslya N. – Ontological Modelling of Blockchain-based Industrial Socio-cyber-physical Systems (the Russian Science Foundation, 2017-2019 – Grant No. 17-71-10223).

Shilov N. – Context-Dependent Proactive Modelling for Decision Support in Transport Systems (the Russian Foundation for Basic Research, 2015-2017 – Grant No. 15-07-08391 jointly with Prof. B. Sokolov' lab, SPIIRAS).

Kashevnik A. – Development of Methodology and Models of Context-Driven Knowledge Sharing for Service-Oriented Decision Support Systems (the Russian Foundation for Basic Research, 2016-2018 – Grant No. 16-07-00462).

Pashkin M. – Development of Methods and Models of Intelligent Decision Support for Personalized Intangible Products Configuring (the Russian Foundation for Basic Research, 2016-2018 – Grant No. 16-07-00375).

Ponomarev A. – Development of Methodology and Models for Decision-Support Systems Based on Crowd Computing (the Russian Foundation for Basic Research, 2016-2018 – Grant No. 16-07-00466).

Ponomarev A. – Development and Analysis of Quality Control Methods in Large-Scale Human-Computer Computation Systems (the Russian Foundation for Basic Research, 2016-2018 – Grant No. 16-37-60107(mol_dk)).

Ponomarev A. – Theoretical and Technological Foundations of Poly-Model Context-Aware Recommendation Systems (the Russian Foundation for Basic Research, 2016-2018 – Grant No. 16-07-00463 jointly with Prof. V. Osipov' lab, SPIIRAS).

Smirnov A. – Decision Support Models at Joint Activities of Socio-Cyberphysical System Participants (the Russian Foundation for Basic Research, 2017-2019 – Grant № 17-07-00247)

Levashova T. – Models of Knowledge Acquisition by Resources of Socio-Cyberphysical Systems at Decision Making (the Russian Foundation for Basic Research, 2017-2019 – Grant № 17-07-00248).

Savosin S. – Ontology Alignment Method Development Based on Composition of Neural Networks (the Russian Foundation for Basic Research, 2017-2019 – Grant № 17-07-00328).

Teslya N. – Development of Theoretical and Technological Foundations of Cognitive Assistants for Decision Making in Ontology Alignment (the Russian Foundation for Basic Research, 2017-2019 – Grant № 17-07-00327).

Shilov N., Kashevnik A. – Development of Models for Vehicle Incidents Alerting based on Mobile Video Measurements of a Driver Behavior (the Russian Foundation for Basic Research, 2017-2020 – Grant № 17-29-03284-ofi).

Smirnov A., Teslya N. – Theoretical and Technological Foundations of the Formation and Decentralized Planning of the Intellectual Robots Coalition Behavior Based on Socio-inspired Self-organization and Smart

Contracts (the Russian Foundation for Basic Research, 2017-2020 – Grant № 17-29-07073-ofi, jointly with Prof. B. Sokolov' lab, SPIIRAS).

University Courses

SPSEEU, Department of Information Technologies and Information Security: Intelligent Data Analysis – N. Shilov, Theory of Decision Making – A. Ponomarev, Functional and Logical Programming (A. Ponomarev).

ITMO University, Department of Information Systems: Intelligent Technologies for Socio-Cyber-Physical Systems (A. Smirnov), Smart Space Technologies – A. Kashevnik, Infomobility Technologies (N. Teslya).

Conferences

2017 IEEE Conference on Cognitive and Computational Aspects of Situation Management, March 27-31, 2017, Savannah, GA, USA – Shilov N.

VII All-Russian Scientific & Practical conference "Theory and Practice of System Dynamics", March 27-31, 2017, Apatity, Russia – Smirnov A.

The 20th Conference of Open Innovations Association FRUCT, April 3-7, 2017, St.Petersburg, Russia – Smirnov A., Kashevnik A., Ponomarev A., Teslya N., Shchekotov M., Levashova T., Shilov N.

The 8th International Symposium "Information Fusion and Intelligent Geographical Information Systems 2017", May 10-12, 2017, Shanghai, China – Teslya N.

The 15th International Conference on Practical Applications of Agents and Multi-Agent Systems (PAAMS), June 21-23, 2017, Porto, Portugal – Smirnov A.

The 20th International Conference on Business Information Systems (BIS 2017), June 28-30, 2017, Poznan, Poland – Shilov N.

The 14th International Conference on Product Lifecycle Management (PLM17), July 9-12, 2017, Seville, Spain – Smirnov A.

The 5th International Conference on Serviceology (ICServ2017), July 12-14, 2017, Vienna, Austria – Shilov N.

Internet of Things, Smart Spaces, and Next Generation Networks and Systems. NEW2AN 2017, ruSMART 2017, NsCC 2017, NEW2AN/ruSMART 2017 (ruSmart/New2AN), August 28-30, 2017, St.Petersburg, Russia – Teslya N.

The 8th International Conference on Industrial Applications of Holonic and Multi-Agent Systems (HoloMAS 2017), August 28-31, 2017, Lyon, France – Levashova T.

The Intelligent Systems and Technologies Conference (IS&IT'17), September 2-9, 2017, Divnomorskoe, Russia – Smirnov A.

The 10th All-Russian Multi-conference on Problems in Control (MCPC 2016), September 11-16, 2017, Divnomorskoe, Russia – Smirnov A.

The 2nd International Conference on Interactive Collaborative Robotics ICR-2017, September 12-16, 2017, London, UK – Kashevnik A.

The 2nd Russian-Pacific Conference on Computer Technology and Applications (RPC 2017), September 25-29, 2017, Vladivostok, Russia – Ponomarev, A.

The 21st Conference of Open Innovations Association FRUCT, November 6-10, 2017, Helsinki, Finland – Smirnov A., Kashevnik A., Ponomarev A., Teslya N.

The IEEE 7th International Symposium on Cloud and Service Computing (IEEE SC2-2017), November 22-25, 2017, Kanazawa, Japan – Ponomarev A.

International Cooperation

Smirnov A. – consulting of Ford Motor Company (USA) and Festo (Germany).

Membership in Domestic and International Societies, Editorial Boards, etc.

Smirnov A. – member of Scientific Council of the Russian Academy of Sciences on Scientific Basis of Information Technologies and Automation; an expert of the Russian Ministry of Education and Science in the area “Information Technologies and Computational Systems”, an expert of Analytical Center of Russian Government; a member of technical committee of IFAC TC 5.1 on Manufacturing Plant Control; a member of technical committee of IFIP TC WG5.1 on Global Product Development for the Whole Life-Cycle; member of IEEE, a member of technical committee of IEEE SMC TC on Cyber-Physical Cloud Systems; a member of technical committee of IEEE SMC TC on Cognitive Situation Management, a honorary member of International Association “Institute for Systems and Technologies of Information, Control and Communication”, and a fellow of the European Academy of Industrial Management. A member of Advisory Committee & Editor Boards: Journal on Information Technologies and Computer Systems (Russian Academy of Sciences, Russia); Journal on Artificial Intelligent and Decision Making (Russian Academy of Sciences, Russia; Scopus); Journal of Information & Control Systems (Russia); Journal “SPIIRAS Proceedings” (SPIIRAS, Russia; Scopus), International Journal of Multiagent and Grid Systems (IOS Press, Scopus); International Journal of Data Analysis Techniques and Strategies (Inderscience Publishers, Scopus); Management and Production Engineering Review (the Polish Academy of Sciences, Scopus); International Journal of Product Lifecycle Management (Inderscience Publishers, Scopus).

Levashova T. – a member of Editor Board of Journal “Complex Systems Informatics and Modeling Quarterly” (RTU Press).

Kashevnik A. – a secretary of the Working Group on Smart Spaces, the Open Innovations Association FRUCT (Finnish-Russian University Cooperation in Telecommunications); an Editor of international Journal of Embedded and Real-Time Communication Systems (IGI Global).

Shilov N. – a member of Editor Board of international Journal of Embedded and Real-Time Communication Systems (IGI Global).

Ponomarev A. – a member of ACM.

Intellectual Property Registered in the Reporting Year

An application for state registration of software program No. 2017614256 10/04/2017 2017 «Mobile Service for Dangerous Situation Detection and Recommendation Generation for Vehicles Drivers based on Front-facing Camera & Sensors of Smartphone (Drive Safely)», A. Smirnov, A. Kashevnik, I. Lashkov

Recent Results

1. A multi-model approach to the construction of context-driven recommendation services for socio-cyberphysical systems has been proposed. The approach prescribes the integration of various recommendation models – both non-personalized (used in the lack of information) and personalized (collaborative filtering and the knowledge-based), while taking into account the user's context (problem context) and the recommendation systems' context (system context). Using the approach helps to improve the quality of recommendations by compensating shortcomings of individual models and leveraging variety of information sources [5,8,12,25,26,29,38,40,47,50].
2. A set of models supporting semantic interoperability for resources of a human-computer cloud has been developed. The set comprises three models: 1) a general ontology model of the human-computer cloud, which is based on the mOSAIC Cloud Ontology extended with classes enabling to represent human as a kind of the cloud's components and with classes required to configure the resource network taking into account the resource competencies; 2) an ontology model of the decision support system operating in the human-computer cloud, which unites concepts needed to configure the resource network according to the decision maker task and 3) a model of information exchange for the resources of the human-computer cloud, in accordance with which information is exchanged using a communication resource through structured messages [7,10,14,23,31,34,43,46,48,49].
3. Context-oriented methods for decision support of infomobile system users have been proposed: (a) multimodal trip planning method for public transport passengers based on multigraph usage and taking into account public transport schedules represented in GTFS format, cartographic information based on OpenStreetMap data, as well as weather and current situation; (b) method of planning joint rides using personal

vehicles with arbitrary meeting points based on the heuristic consisting in considering points within the intersection of circles with radiuses equal to distances the passenger and driver can increase their routes for [2-4,17,20,22,32,41,51,52].

4. A technology for self-organization of a group of mobile robots based on Smart-M3 open source platform has been proposed. This platform supports the joint access to information and knowledge in a smart space. An ontological model of physical space is formed in the smart space; it is used for coordination, synchronization, and monitoring of robots. Self-organization of mobile robots is based on ontology-oriented publish / subscribe mechanism. A prototype of the proposed technology has approved its operability through testing the scenario of constructing an object from components. Lego Mindstorms EV3 Education Kits and LeJOS operating system have been used for building the robots [1,6,18,24,27,30,35-37,39,42,44,53-57].

5. A scenario model of context-oriented knowledge management for decision support by production networks participants has been proposed. The model describes a basis scenario of decision support based on using knowledge and context-related information about production network, as well as preferences of users, which are representing the interest of participants. The model presents an efficient use of participant resources [9,11,13,15,16,19,21,28,35,45].

Awards

Shchekotov M. – The Scholarship of the Government of Russian Federation for PhD students of Full-time Education Programs Complying with the Priority Directions of Modernization and Technological Development of the Russian Economy (2016-2017).

Kashevnik A. – The Diploma for the First Place in Anniversary Competition for the Best Scientific Work between Young Scientists & Specialists of SPIIRAS, 2017.

Mikhailov S., Petrov M., Kashevnik A. – The Best Demo Award of the 20th Association of Open Innovations FRUCT Conference (FRUCT 20) "Coalition Formation Scenario for Obstacle Overcoming by Mobile Robots".

Lashkov I., Kashevnik A. - The Best Demo Award of the 21st Association of Open Innovations FRUCT Conference (FRUCT 21) "Dangerous Events Identification and Recommendation Generation for a Vehicle Driver Using a Personal Smartphone".

References

Monographs

1. Korzun D., Kashevnik A., Balandin S. Novel Design and the Applications of Smart-M3 Platform in the Internet of Things: Emerging Research and Opportunities, IGI Global, 2017. 150 p.

Papers Published in Editions Indexed by WoS, Scopus

2. Smirnov A., Kashevnik A., Ponomarev A. Context-based Infomobility System for Cultural Heritage Recommendation: Tourist Assistant—TAIS. Personal and Ubiquitous Computing, Springer, Heidelberg. 2017. pp. 297–311.
3. Smirnov A., Shilov N., Kashevnik A., Ponomarev A. Cyber-physical Infomobility for Tourism Application. International Journal Information Technology and Management, Inderscience. 2017. Vol. 16(1). pp. 31–52.
4. Kashevnik A., Ponomarev A., Smirnov A. A Multimodel Context-Aware Tourism Recommendation Service: Approach and Architecture. Journal of Computer and System Sciences International, Springer, Heidelberg. 2017. Vol. 56(2). pp. 245–258.
5. Korzun D., Balandin S., Kashevnik A., Smirnov A., Gurtov A. Smart Spaces-Based Application Development: M3 Architecture, Design Principles, Use Cases, and Evaluation. International Journal of Embedded and Real-Time Communication Systems, S. Balandin (Ed.), IGI Global, Hershey, Pennsylvania. 2017. Vol. 8(2). pp. 66–100.
6. Mikhailov S., Kashevnik A. Smart-M3-based Smart Space Creation Using a DD-WRTbased Device. SPIIRAS Proceedings. 2017. Vol. 52 (3). pp. 181–204. (in Russ.).
7. Ponomarev A. Quality Control Methods in Crowd Computing: Literature Review. SPIIRAS Proceedings. 2017. Vol. 54 (5). pp. 152–184. (in Russ.).
8. Kashevnik A., Ponomarev, A., Smirnov, A. Polimodelnyi Kontekstno-Upravliaemyi Rekomenduiushchii Servis v Oblasti Turizma: Podkhod i Arkhitektura. Izvestiya RAN. Teoriya i Sistemy Upravleniya. 2017. № 2. P. 77–91. (in Russ.).
9. Smirnov A., Shilov N., Oroszi A., Sinko M., Krebs T. From Products to Product-Service Systems: Business and Information System Changes. Proceedings of the 19th International Conference on Business Information Systems (BIS 2016), Abramowicz, R. Alt, B. Franczyk (Ed.), Lecture Notes in Business Information Processing, Springer, Heidelberg. 2017. Vol. 263. pp. 148–157.
10. Smirnov A., Shilov N., Gusikhin O. Cyber-Physical-Human System for Connected Car-Based e-Tourism. Proceedings of 2017 IEEE Conference on Cognitive and Computational Aspects of Situation Management, IEEEComSoc. 2017.
11. Sandkuhl K., Smirnov A., Shilov N. Decomposition of Tasks in Business Process Outsourcing. Proceedings of the 20th International Conference on Business Information Systems (BIS 2017), W. Abramowicz (Ed.), Lecture Notes in Business Information Processing, Springer, Heidelberg. 2017. Vol. 288. pp. 296–310.

12. Smirnov A., Kashevnik A., Ponomarev A., Shilov N. Context-Aware Decision Support in Socio-Cyberphysical Systems: from Smart Space-Based Applications to Human-Computer Cloud Services. Advances in Practical Applications of Cyber-Physical Multi-Agent Systems: The PAAMS Collection. Proceedings of the 15th International Conference on Practical Applications of Agents and Multi-Agent Systems (PAAMS), Y. Demazeau, P. Davidsson, J. Bajo, Z. Vale (Ed.), Lecture Notes in Computer Science, Springer, Heidelberg. 2017. Vol. 10349. pp. 3–15.
13. Smirnov A., Shilov N., Oroszi A., Sinko M., Krebs T. Application-Driven Product-Service System Configuration: Customer-Centered Strategy. Proceedings of the 5th International Conference on Serviceology (ICServ2017), Y. Hara, D. Karagiannis (Ed.), Lecture Notes in Computer Science, Springer, Heidelberg. 2017. Vol. 10371. pp. 26–37.
14. Karpovich S., Smirnov A., Teslya N., Grigoriev A. Topic Model Visualization with Ipython. Proceedings of the 20th Conference of Open Innovations Association FRUCT, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 131–137.
15. Smirnov A., Sandkuhl K. Context-Oriented Knowledge Management for Decision Support in Business Socio-Cyber-Physical Networks: Conceptual and Methodical Foundations. Proceedings of the 20th Conference of Open Innovations Association FRUCT, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 413–419.
16. Levashova T., Pashkin M. Personalized Configuration of Immaterial Products. Proceedings of the 20th Conference of Open Innovations Association FRUCT, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 228–235.
17. Taramov A., Shilov N. A Systematic Review of Proactive Driver Support Systems and Underlying Technologies. Proceedings of the 20th Conference of Open Innovations Association FRUCT, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 448–459.
18. Mikhailov S., Kashevnik A. M3-Driven Smart Space Creation Using a DD-WRT-Based Device. Proceedings of the 20th Conference of Open Innovations Association FRUCT, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 285–283.
19. Stepanenko V., Kashevnik A. Competence Management Systems in Organisations: a Literature Review. Proceedings of the 20th Conference of Open Innovations Association FRUCT, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 427–433.

20. Smirnov A., Teslya N., Kashevnik A. Context-aware Routing Service for Intelligent Mobile Tourist Guide. Proceedings of the 8th International Symposium “Information Fusion and Intelligent Geographical Information Systems 2017”, Lecture Notes in Geoinformation and Cartography, Springer, Heidelberg. 2017.
21. Smirnov A., Shilov N., Oroszi A., Sinko M., Krebs T. Product Knowledge Management Support for Customer-Oriented System Configuration. Proceedings of the 20th International Conference on Business Information Systems (BIS 2017), W. Abramowicz (Ed.), Lecture Notes in Business Information Processing, Springer, Heidelberg. 2017. Vol. 303. pp. 49–58.
22. Smirnov A., Ponomarev A., Teslya N., Shilov N. Human-Computer Cloud for the Smart Cities: Tourist Itinerary Planning Case Study. Proceedings of the 20th International Conference on Business Information Systems (BIS 2017), W. Abramowicz (Ed.), Lecture Notes in Business Information Processing, Springer, Heidelberg. 2017. Vol. 303. pp. 179–190.
23. Smirnov A., Levashova T., Kashevnik A. Ontology-Based Cooperation in Cyber Physical Social Systems. Proceedings of the 8th International Conference on Industrial Applications of Holonic and Multi-Agent Systems (HoloMAS 2017), Lecture Notes in Computer Science, Springer, Heidelberg. 2017. Vol. 10444. pp. 66–79.
24. Petrov M., Kashevnik A. Ontology-based Indirect Interaction of Mobile Robots for Joint Task Solving: a Scenario for Obstacle Overcoming. Proceedings of the 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings", MATEC Web of Conferences, EDP Sciences. 2017. Vol. 113. pp. 1–6.
25. Ponomarev A. Community Photo Tagging: Engagement and Quality Study. Proceedings of the 2017 ACM Web Science Conference, The 9th International ACM Web Science Conference 2017 (WebSci'17). 2017. pp. 409–410.
26. Smirnov A., Ponomarev A., Kashevnik A. Multi-model Service for Recommending Tourist Attractions. Proceedings of the 18th International Conference on Enterprise Information Systems (ICEIS 2016), Hammoudi, S., Maciaszek, L.A., Missikoff, M.M., Camp, O., Cordeiro, J. (Ed.), Lecture Notes in Business Information Processing, Springer, Heidelberg. 2017. Vol. 291. pp. 364–386.
27. Smirnov A., Kashevnik A., Petrov M., Parfenov V. Context-Based Coalition Creation in Human-Robot Systems: Approach and Case Study. Proceedings of the 2nd International Conference on Interactive Collaborative Robotics ICR-2017, A. Ronzhin, G. Rigoll, R. Meshcheryakov (Ed.), Lecture Notes in Computer Science, Springer, Heidelberg. 2017. Vol. 10459. pp. 229–239.

28. Wißotzki M., Sandkuhl K., Smirnov A., Kashevnik A., Shilov N. Digital Signage and Targeted Advertisement Based on Personal Preferences and Digital Business Models. Proceedings of the 21st Conference of Open Innovations Association FRUCT, ITMO University, St.Petersburg. 2017. pp. 375–381.
29. Smirnov A., Ponomarev A., Levashova T., Shilov N. Ontology-based Cloud Platform for Human-driven Applications. Proceedings of the 21st Conference of Open Innovations Association FRUCT, Helsinki, ITMO University, St.Petersburg. 2017. pp. 304–310.
30. Teslya N., Ryabchikov I. Blockchain-Based Platform Architecture for Industrial IoT. Proceedings of the 21st Conference of Open Innovations Association FRUCT, ITMO University, St.Petersburg. 2017. pp. 321–329.
31. Smirnov A., Teslya N., Shilov N. Ontology Matching for Socio-Cyberphysical Systems: An Approach Based on Background Knowledge. Internet of Things, Smart Spaces, and Next Generation Networks and Systems. NEW2AN 2017, ruSMART 2017, NsCC 2017, NEW2AN/ruSMART 2017 (ruSmart/New2AN), St.Petersburg, Russia, August 28-30, 2017, Galinina O., Andreev S., Balandin S., Koucheryavy Y. (Ed.), Lecture Notes in Computer Science, Springer, Heidelberg. 2017. Vol. 10531. pp. 29–39.
32. Kashevnik A., Lashkov I., Parfenov V., Mustafin N., Baraniuc O. Context-Based Driver Support System Development: Methodology and Case Study. Proceedings of the 21st Conference of Open Innovations Association FRUCT, ITMO University, St.Petersburg. 2017. pp. 162–171.
33. Smirnov, A., Shilov, N., Oroszi, A., Sinko, M., Krebs, T. Changing Information Management in Product-Service System PLM: Customer-Oriented Strategy. Proceedigns of PLM17, IFIP 14th International Conference on Product Lifecycle Management (PLM17), IFIP Advances in Information and Communication Technology, Springer, Heidelberg. 2017.
34. Smirnova O.V., Popovich T.V. Ecological Monitoring Network for the Gulf of Finland. Proceedings of the 22nd International Conference on Urban Planning Regional Development and Information Society GeoMultimedia 2017, pp. 165–169.

Papers Published in Russian editions indexed by RSCI

35. Kashevnik A. An Approach to Semantic Interoperability Support between Mobile Robots for Coalition Formation. Information Technologies and Computing Systems. 2017. Vol. 1. pp. 90–100. (in Russ.).
36. Petrov M., Kashevnik A. An Ontology-oriented Approach to Indirect Interaction between Users and Mobile Robots for Joint Task Solving. Science Bulletin of NSTU. 2017. Vol. 1, No. 66. pp. 110–118. (in Russ.).

37. Mironov M., Kashevnik A. Adaptive Remote Control Interface Based on Smartphone Application for Six-Wheeled Mobile Robot. Proceedings of TUSUR. 2017. Vol. 20, No. 1. pp. 110–118. (in Russ.).
38. Smirnov A., Ponomarev A., Kashevnik, A., Levashova, T., Teslya, N. Human-computer Cloud for Decision Support: Methodology and Platform Architecture. Information Technologies and Computing Systems. 2017. No. 1. pp. 30–39. (in Russ.).
39. Shpakov V. About Situation-Event Approach to Control of Interacting Discrete-Continuous Processes. Information and Control Systems. 2017. Vol. 2, No. 87. pp. 26–33. (in Russ.).
40. Ponomarev, A. Tagging Public Event Images based on Non-Monetary Incentives. Information and Control Systems. 2017. No. 3. pp. 105–114. (in Russ.).
41. Lashkov I. Driver's Behavior Analysis with Smartphone Front Camera. Information and Control Systems. 2017. No. 5. pp. 7–17. (in Russ.).
42. Shilov N., Shchekotov M. Ontological Modelling of State Machines for Cyberphysical System Services. Information and Control Systems. 2017. Vol. 90, No. 5. pp. 80–88. (in Russ.).
43. Smirnov A., Levashova T. Knowledge Acquisition in Socio-Cyber-Physical Systems through Information Exchange Between Resources. Information and Control Systems. 2017. No. 6. pp. 103–112. (in Russ.).
44. Komzalov A., Shilov N. Application of Modern Technologies in Advanced Driver Assistance Systems. Journal of Instrument Engineering. 2017. Vol. 60, No. 11. pp. 1077–1082. (in Russ.).
45. Gugunova P., Kashevnik A. Cooperative Interaction of Expert Networks Participants: State-of-the Art Analysis. Scientific and Technical Journal of Information Technologies, Mechanics and Optics. 2017. Vol. 17, No. 5. pp. 859–871. (in Russ.).
46. Smirnov A., Ponomarev A., Kashevnik A., Levashova T., Teslya N. Human-machine Cloud Computing for Decision Support in Tourism: Main Tasks and Scenarios. Artificial Intelligence and Decision Making. 2017. No. 2. pp. 90–102. (in Russ.).
47. Ivakin Y., Potapychev S., Smirnova O. Application of GIS Tools of Geochronological Tracking for Network Analysis of Biographical Data. Information and Space. 2017. No. 1. pp. 132–138. (in Russ.).
48. Smirnova O. Ontology Approach in Context-aware Applications. Informatization and communication. 2017. №4. pp. 145–150. (in Russ.).

Other Publications

49. Teslya N., Chupryna P. Neural Networks usage in Ontology Matching: a Literature Review. Proceedings of the 20th Conference of Open Innovations Association FRUCT (abstracts), St.Petersburg, S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 568–571.
50. Ponomarev A., Danilova V. Hybrid Recommender Systems: The Review of State-of-the-Art Research and Applications. Proceedings of the 20th Conference of Open Innovations Association FRUCT (abstracts), S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 572–578.
51. Komzalov A., Shilov N. Driver Assistance Systems: State-of-the-Art and Possible Improvements. Proceedings of the 20th Conference of Open Innovations Association FRUCT (abstracts), S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 602–608.
52. Lashkov I., Kashevnik A. “Drive Safely” – Driver Assistance Application for Android. Proceedings of the 20th Conference of Open Innovations Association FRUCT (abstracts), S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 624–625.
53. Mironov M., Kashevnik A. Smartphone-Based Adaptive Remote Control Interface for Six-Wheeled Mobile Robot. Proceedings of the 20th Conference of Open Innovations Association FRUCT (abstracts), S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 650–656.
54. Petrov M., Kashevnik A. Ontology-Based Indirect Interaction of Users and Mobile Robots for Joint Activities. Proceedings of the 20th Conference of Open Innovations Association FRUCT (abstracts), S. Balandin, A. Levina, T. Tyutina (Ed.), ITMO University, St.Petersburg. 2017. pp. 681–686.
55. Smirnov A., Kashevnik A. Mobile Robot Coalition Forming for Joint Task Implementation. Proceedings of the VII All-Russian Scientific Conference “Theory and Practice of System Dynamics". 2017. pp. 74–78. (in Russ.).
56. Smirnov, A., Kashevnik, A. Organization of Ontology-oriented Interaction in Dynamic-formed Mixed Coalitions of Mobile Robots: Principles and Conceptual Basis. Proceedings of the 10th Multiconference on Problems in Control (MCPC 2017). 2017. pp. 319–321. (in Russ.).
57. Smirnov, A., Kashevnik, A. Context -Oriented Approach to Joint Task Solving by Group of Mobile Robots. Proceedings of the Intelligent Systems and Technologies Conference (IS&IT‘17). 2017. (in Russ.).

Laboratory of Information Technologies in System Analysis and Modeling

Head of the Laboratory: Dr. Tech. Sci., Professor, Honored Scientist of the Russian Federation, Laureate of the RF Government Prize in Science and Technology Boris V. Sokolov – fundamental and applied investigations in system modeling and in the theory of optimal control, development of mathematical models and methods for multi-objective decision making in complex technical-organizational systems under conditions of uncertainty. sokol@iias.spb.su

Laboratory Staff – 16 members and 6 post-graduate students.

Research Activities

Development, research and implementation of methodological, methodical and technological bases of automation and intellectualization of processes of integrated modeling and simulation, proactive monitoring, control for complex objects at different stages of their life cycle.

Research Fellows

Leading researcher Dr. Tech. Sci., Professor Vyacheslav I. Mironov – fundamental and applied investigations in system modeling, in the theory of optimal observation and dynamic-processes control, in calculus mathematics, in space-flight ballistics, and in statistical analysis as applied to characteristics of complex technical systems, mironuv@yandex.ru

Leading researcher Dr. Tech. Sci., Professor, Honored Scientist of the Russian Federation Yury I. Ryzhikov – numerical approximation, queuing theory and simulation, inventory theory, educator of scientists, ryzhbox@yandex.ru

Leading researcher Dr. Tech. Sci., Professor, Honored Scientist of the Russian Federation Alexander P. Kovalev – system analysis and modeling of complex space-rocket systems at different stages of their life cycle.

Leading researcher Dr. Tech. Sci., Professor Vladimir V. Mikhailov – Modeling of populational, ecological, and ecological-economical systems, modeling of bioclimatic fields for ranges of populations, vvm@iias.spb.su

Leading researcher, Dr.Tech. Sci., Professor Mikhail Yu. Okhtilev – fundamental approaches to structure-functional synthesis of intellectual information technologies and real-time monitoring systems as applied to complex technical objects in dynamic environment, oxt@email.ru

Leading researcher Dr. Econom. Sci., Professor Dmitry N. Verzilin – modeling of socio-economic systems and processes, verzilin@sv101000.spb.edu

Leading researcher Dr.Tech. Sci., Professor Vyacheslav A. Zelentsov – Intellectual information technologies, integrated processing of aerospace information in monitoring and control systems servicing organizational-technical complexes, the theory of hierarchical systems, reliability and maintenance of complex systems, v.a.zelentsov@gmail.com

Leading researcher Dr.Tech. Sci., Professor. Felix M. Kulakov – supervisory control of robots, research automation of mechatronic and robotic systems, virtual and augmented reality. kul@iias.spb.su

Leading researcher Dr.Tech.Sci., Professor Alexander A. Musaev – modeling and automation of control processes for complex technological objects, amusaev@technolog.edu.ru

Leading researcher Dr. Tech. Sci., Associate Professor Vadim V. Burakov – Methodology of software quality evaluation, refactoring of software, Burakov@eureca.ru

Leading researcher Dr. Tech. Sci., Professor Albert A. Vorobjev – fundamental and applied researches of management problems of complex organizational and technical systems at various stages of their life cycle. maestro265@yandex.ru

Senior researcher, Dr. Tech. Sci., Associate Professor. – Alexander N. Pavlov – Models and methods of multi-criteria decision making under uncertainty, pavlov62@list.ru

Leading researcher Dr. Tech. Sci., Professor Stanislav V. Mikoni– system analysis, intelligent technologies, decision-making theory, svm@sm4265.spb.edu

Senior researcher Cand. Tech.Sci. Alexander N. Kozhanov – fundamental and applied research on problems of an integrated modeling, development of mathematical models and methods for decision-making support in complex organizational and technical systems, application of geo-systems, kan_spb@mail.ru.

Senior researcher Cand. Tech. Sci., Associate Professor Alevtina V. Zyuban – problem-oriented databases, software for computing and communication systems and networks, information technologies of intelligent decision-support, researches of socio-economic and economic-geographic processes, economic problems of modernization, innovative development and environmental safety applying natural science methods, alevasz@gmail.com

Senior researcher Cand. Tech. Sci. Semen A. Potriasaev – fundamental and applied problems of integrated modeling and control of dynamic systems with reconfigurable structure, the development of mathematical models and methods for decision support in complex organizational and technical systems under uncertainty and multi-criteria, semp@gmail.com

Senior researcher Cand. Phys.-Math. Sci. Inna V. Trofimova – research and development of models and methods for real-time correction of plans defining the use of information systems, isolovyeva@mail.ru

Senior researcher Cand. Tech. Sci. Anton E. Pashchenko – modeling and statistical evaluation of the parameters of risk behavior in the information deficit. The use of scenario approaches for the development of mathematical models and methods for decision support in complex organizational and technical systems, aep@iias.spb.su

Junior researcher MS Maria R. Ponomarenko - cartography and geoinformatics. pnmry@yandex.ru

Post-Graduate Students

Kulakov A.Yu. – Models and algorithms for reconfiguring complex objects under changing conditions – supervised by Associate Professor Pavlov A.N.

Pimanov I.Yu. – supervised by Professor Zelentsov V.A.

Nazarov D.I. – supervised by Professor Sokolov, B. V.

Krylov A.V. – supervised by Professor Sokolov, B. V.

Ohtilev P.A. – supervised by Professor Sokolov, B. V.

Gnidenko A.S. – SPIIRAS graduate student, set of 2016 – supervised by Associate Professor Burakov, V.V.

Zakharov V.V.– supervised by Associate Professor Burakov, V.V.

Sobolevskiy V.A.– supervised by Professor Sokolov, B.V.

Ushakov V.A.– supervised by Professor Sokolov, B.V.

Rostova E.N.– supervised by Professor Sokolov, B.V.

Grants and Projects

Mikhailov V.V. – RFBR Project #15-07-01230: Development of methods of computational modeling of the dynamics exposed to excessive industrial catches of fish populations and evaluate the effectiveness of measures for their artificial restoration based event-driven scenario models. (2015-2017).

Ohtilev M.Yu. – RFBR Project #15-08-08459: Research and development of models and methods of complex adaptive planning of the system management of complex technical objects. (2015-2017)

Sokolov B.V. – RFBR Project #15-07-08391: Context-sensitive predictive modeling complex to support decision making in transportation systems. (2015-2017) (Together with the laboratory Smirnov A.V.)

Yusupov R.M. — RFBR Project #16-07-00779 "Development of methodology and model-algorithmic suppoting of pro-active management of socio-cyber-physical systems structural dynamics». (Executors Sokolov B.V., Pavlov A.N.)

Zelentsov V.A. — RFBR Project #16-08-00510 «Development and research of the methodology and creation of automated infor-

mation system prototype for the forecasting of Extreme North vegetation's state on the basis of integrated processing of multi- and hyperspectral ground-aerospace data and climatic information »

Pavlov A.N. (executor) — RFBR Project #16-08-01277 «Research and development of models and algorithms for reconfiguration of ground and space based multifunction robotic systems in dynamic conditions» (Principal Investigator — Vladimir G. Parfjenov (University ITMO)).

Burakov V.V. – RFBR Project #17-08-00797 «Research and development of methodological basis and technology of integrated modelling and simulation of complex technical objects proactive control system».

Verzilin D.N. – RFBR Project #17-06-00108 «Research and development of scientific and methodological basis of multi-criteria evaluation and forecasting of socio-economic indicators of the ecological and economic objects in the Baltic Sea coastal zone».

Mikoni S.V. – RFBR Project #17-01-00139 «Development of a methodology of structuring and analyzing the properties of complex technical systems».

Yusupov R.M. – RFBR Project #17-20-01214-ofi_m_RGD «Methodology and intelligent technologies for integrated proactive planning, scheduling and management of urban transport in given scenarios of expansion of settlement zones of residents of large modern cities of the Russian Federation».

Mikoni S.V. – RFBR Project #17-01-00139 « Development of a methodology of structuring and analyzing the properties of complex technical systems».

Sokolov B.V. – RFBR Project #17-29-07073-ofi_m_ « Theoretical and technological foundations of the formation and decentralized planning of the intellectual robots coalition behavior based on socio-inspired self-organization and smart contracts». (jointly with the laboratory of Smirnov A.V.)

Sokolov B.V., Potryasaev S.A. (executor) — Project #16-19-00199-p «Methods for synthesis of intellectual information technology for monitoring, prediction and dynamic control of resources and reconfiguration of ground- and space-based multifunction group of dynamic objects» (Principal Investigator — Shalyto A.A. (University ITMO). SPIIRAS executors Pavlov A.N., Potryasaev S.A., Kulakov F.M., Mikhailov Y.V.

Pavlov A.N., Potryasaev, S.A., Kulakov, F.M., Mikhailov, Y.V. (executors) — RFBR Project #16-08-01277 « Research and development of models and algorithms for reconfiguration of multifunctional robotic systems of terrestrial and space based in dynamically changing conditions » (Principal Investigator — Parfenov V.G. (University ITMO)).

Sokolov B.V. – RSF Project #17–11–01254 «Methodology and service-oriented technology for the development and implementation of

the system for integrated automated modeling of natural and natural-technological objects and its application for the operational forecasting of river floods». (2017–2019).

Yusupov ,R.M. — RFBR Project #16-29-09482 «Prediction of the network-based terrorist threats appearance and elaboration of countermeasures in metropolises». (2016-2018) (Sokolov B.V., Pavlov A.N. — executors).

Sokolov B.V. — «Development and research of intellectual information technologies of monitoring, multi-profile forecasting and the guaranteed anticipatory safety management of critical infrastructures in emergency situations with use of land and aerospace systems of the Russian Federation». he project is carried out with financial support of the Ministry of Education and Science of the Russian Federation, a state task № 2.3135.2017/K. (2017–2019) (Together with Volga State University of Technology.)

Zelentsov V.A. — Project #47702388027160001690/073-SPIIRAS «Materials preparation to the core design for creation of a system for providing of consumers with Earth remote sensing data from space». Project customer: Joint-Stock Company «Research Institute of Precision Instruments» (JSC «RI PI»).

Zelentsov V.A. — Project #05/HD/2017 «Work performance on the Leningrad Region Spatial Data Fund (SDF) development». The project is carried out in the interests of the Committee on Communications and Informatization of the Leningrad Region.

Sokolov B.V. — International project «Technology-US» – «Development of methodological issues and software for ground and onboard functional modules aimed at restoration of satellite up state in emergency and critical onboard situations». Project customer: Space Systems Research and Development Institute (NII KS), Khrunichev State Research and Production Space Center.

Sokolov B.V. — Development of methodological support and experimental software for the analysis and prediction of reliability characteristics of the small-size spacecraft on-board equipment at various stages of the life cycle», Project customer: Space Systems Research and Development Institute (NII KS), Khrunichev State Research and Production Space Center (the IV stage).

Sokolov B.V. — State research 0073-2014-0009 «Methodology and technologies of integration of existing and prospective state and commercial information-management and telecommunication systems and networks at various stages of their life cycle».

Yusupov R.M. – Fundamental research Program of the Division of Nanotechnologies and Information Technology (DNIT RAS), "Fundamentals of Information Technology and Systems" “Intelligent infor-

mation technology, systems analysis and automation” (Project #0073-2015-0007) “Fundamental bases of design and use of sotsio-cyber-physical systems on the basis of technologies of universal calculations, communications and multimodal user interfaces”.

Mironov V.I. — Component of developmental work "Mentor KV/Research Center of SPb THIS" "Methods and algorithms of mathematical modeling of the indignant movement of special carriers and the payloads removed by them". Customer is Concern Almaz-Antey.

Mironov V.I. — Component of developmental work "Ground-21" "Methods and algorithms of optimum processing of navigation measurements of a polygon measuring complex". The general customer - the Ministry of Defence of the Russian Federation.

Mironov V.I. — Materials of the draft design. Methods and algorithms for statistical estimation of the parameters of the orbital motion of space objects from the angular measurements of complexes of optoelectronic facilities and the planning of their operation. The project customer — Roscosmos.

University Courses

SPbSUAU, Chair of computer systems and networks. Subjects: Modeling packages, Simulation technologies, Discrete mathematics (Mikhailov V.V.).

SPbSUAU, Chair of computer mathematics and programming. Subjects: Systems Analysis, Mathematical Methods and models of operations research (Sokolov B.V.).

The Russian Academy of National Economy and Public Administration under the President of the Russian Federation. Faculty of Economics (Moscow): "Decision theory" (Mikoni S.V.).

The First Electrotechnical University (ETU) "Decision theory" (Mikoni S.V.).

SPbSPU, Chair of political economy. Subjects: Mathematical methods in economics (Verzilin D.N.).

Mojaisky MCA, Chair of computer-aided control systems. Subjects: Methods and technologies of control decision making; Systems analysis and organization of computer-aided control systems. Interbranch Institute for education and information. Subjects: Basics of System approach and systems analysis; Processes control (Pavlov, A.N.).

SPbSUAU, Chair of computer mathematics and programming. Subjects: Design of software tools for scientific researches (Zelentsov V.A.).

Mojaisky MCA, Chair for aircraft autonomic control systems. Subjects: Spacecrafts control systems (Mironov, V.I.).

SPbSUAU, Chair of computer mathematics and programming. Subjects: Database management system and databases, Programming C++. (Zjuban A.V.).

St. Petersburg State University, faculty of Applied Mathematics and Control Processes. Elective course Mathematical modeling of social and economic processes (Solovieva I.V.).

SPbSUAU, Chair of computer mathematics and programming. Subjects: Structures and data processing algorithms, Algorithms and structures for data processing (Matiash V.A.).

St. Petersburg State Technological Institute (Technical University), Department of System Analysis. Subjects: "Theory of probabilities and mathematical statistics", "Methodology of dissertation research" (for postgraduate students) (Musaev A.A.).

SPbSUAU, Chair of computer mathematics and programming. Subjects: The structure and data processing algorithms; Opportunities and the use of remote sensing of the Earth; Remote sensing - Space-based Information Processing (Matiash V.A.).

Conferences

154th Scientific and Methodological Conference of St. Petersburg State Technical University (TU), Febrary, 2017, St. Petersburg, Russia – Musaev A.A.

Scientific and practical conference "Actual problems of protection and security", section "Problems of organization of material and technical support for military security", April 4-6, 2017, St.Pepersburg, Russia – Vorobjev A.A.

XVI International scientific-practical conference "Logistics: current trends of development"», April 6-7, 2017 – Sokolov B.V.

12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017 (MATEC Web Conf.), April 18, 2017, St.Petersburg, Russia – Sokolov B.V., Nazarov D.I.

XVI International scientific-practical conference "Actual problems of business education", April 20-21, 2017, Minsk, Belarus – Verzilin D.N.

6 th Computer Science On-line Conference 2017, April 26–29, 2017, on-line, United States – Sokolov B.V., Potrjasaev S.A., Pashhenko A.E., Pimanov I.Ju., Ponomarenko M.R., Trofimova I.V., Ohtilev P.A., Krylov A.V., Pavlov A.N.

The 71st Regional Scientific and Technical Conference "Student Spring-2017", May 24, 2017, St. Petersburg, Russia – Pavlov A.N.

The XX International conference on Soft Computing and Measurement (SCM-2017), May 24-26, 2017, St.Petersburg, Russia – Mikoni S.V.

Digital Transformation and Global Society: Second International Conference, DTGS 2017, June 21–23, 2017, St. Petersburg, Russia – Verzilin D.N.

4th International scientifically-practical conference «Simulation and complex modelling in marine engineering and marine transporting

systems» (SCM MEMTS-2017), June 28, 2017, St.Petersburg Russia – Sokolov B.V., Ryzhikov Y.I.

The VIIth All_Russian All-Russian scientific-practical conference "Fuzzy systems, soft computing and intelligent technologies (NSMV-2017)», July 3-7, 2017, St.Petersburg, Russia – Mikoni S.V.

V All-Russian scientific and technical conference with international participation "Actual problems of rocket and space technology", "V Kozlov Readings", September 11-15, 2017, Samara, Russia – Zelentsov V.A. Potryasayev S.A., Sokolov B.V.

The 10th All-Russia multi-conference on control problems (MCCP-2017), September 11-16, 2017, Divnomorskoe, Russia – Mikoni S.V., Sokolov B.V., Yusupov R.M.

2nd International Scientific Conference “Intelligent information technologies for industry”, September 14-16, 2017, Varna, Bulgaria – Verzilin D.N.

The 19th International Conference on Harbor, Maritime & Multimodal Logistics Modelling and Simulation (HMS2017), September 18-20, 2017, Barselona, Spain – Sokolov B.V., Zelentsov V.A., Kovalev A.P.

The 29th European Modeling & Simulation Symposium (EMSS2017), September 18-20, 2017, Barselona, Spain – Sokolov B.V., Mikoni S.V., Pimanov I.Ju., Burakov V.V, Zjuban A.V.

The IIIth Interregional scientific-practical conference "Perspective directions of development of native information technologies", September 19-22, 2017, Sevastopol – Mikoni S.V.

International conference “Quo vaditis agriculture, forestry and society under global change?” 2nd - 4thOctober 2017 Velké Karlovice, Czech Republic – Zelentsov V.A., Potrjasaev S.A., Pimanov I.Y.

The 8th All-Russian Scientific and Practical Conference "Simulation Modeling. Theory and practice» IMMOD-2017, October 18-20, 2017, St. Petersburg, Russia – Sokolov B.V., Ryzhikov Yu.I., Pimanov I.Yu., Mikoni S.V.

All-Russian Scientific and Practical Conference, Institute for Regional Economy Problems of the Russian Academy of Sciences, October 24-25, 2017, IPRE RAS, St. Petersburg, Russia – Verzilin D.N.

The 7th Belorussian Space Congress, October 24-26, 2017, Minsk, Republic of Belarus – Pimanov I.Y., Zelentsov V.A., Potrjasaev S.A.

All-Russian forum "System of distributed situational centers as a basis for digital transformation of public administration" (SRPS-2017), October 25-27, 2017, St. Petersburg Russia – Pavlov A.N.

XXI All-Russian Scientific and Practical Conference "Scientific and Practical Aspects of Improving Control of Spacecraft and Information Support for Launching Spacecraft", October 26-27, 2017, Krasnoznamensk, Russia – Mironov V.I.

XVI International Conference "Information Technologies and Mathematical Modeling - ITMM-2017", October 2017, Kazan – Ryzhikov Y.I.

The Xth Interregional Conference "Information Security of Russian Regions (ISRR-2017)», November 1-3, 2017, St.Petersburg, Russia – Mikoni S.V.

The second international scientific and practical conference "Geodesy, cartography, geoinformatics and cadastres. From idea to implementation ", November 8-10, 2017, St. Petersburg, Russia – Pimanov I.Yu., Ponomarenko M.R.

3The All-Russian Scientific and Technical Conference "Theoretical and Applied Problems of Development and Improvement of Automated Control Systems for Military Purposes", November 22, 2017, St. Petersburg, Russia – Pavlov A.N.

International conference "Monitoring of natural and man-made objects", November 30 - December 1, 2017, Minsk, Republic of Belarus – Zelentsov V.A.

XVI Russian Conference "Distributed Information and Computing Resources. Science - to the digital economy "(DICR-2017), December 4-7, 2017, Novosibirsk, Akademgorodok, Russia – Pavlov A.N.

17th International Scientific and Practical Conference "Systems of Design, Technological Preparation of Production and Management of the Life Cycle of an Industrial Product" (CAD / CAM / PDM - 2017), December 12-14, 2017, Moscow, Russia, – Potryasayev S.A., Kulakov F.M.

3rd All-Army Military Scientific Conference "Problems of Space Forces and Means in the System of Operations of the Armed Forces of the Russian Federation", St. Petersburg, Russia – Pavlov A.N.

Research Management

Member of the Program Committee of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Application in Science and Industry "Simulation Modeling. Theory and practice "(IMMOD-2017) – Sokolov B.V.

Organization of the 29th International scientific MMTT-29 conference "Mathematical Modelling in the Equipment and Technologies" (St. Petersburg, June, 2017) – Musayev A. A.

International Collaboration

Cooperation with the International Public Committee for implementation of International Aerospace System Project of the Global Monitoring (IASMS): representation of SPIIRAS as a participant in IASMS noncommercial partnership, cooperation on defining the principles and methodology for integration of heterogeneous navigation and telecommunication resources.

Collaboration with Lappeenranta Technological University - organization of training courses for students, postgraduated students and lecturers of the State University of Aviation Instrumentation.

Cooperation with the Institute of Informatics Problems of the National Academy of Sciences of Belarus: the exchange of trainees, requirements specification for the joint international program "Monitoring-SG."

Cooperation with Global Chage Research Institute CAS, Brno, Czech Republic.

Cooperation with Tomas Bata University, Zlin, Czech Republic.

Participation in the International project «Innovative teaching and learning atrategies in open modelling and simulation environment for student-centered engineering education / InMotion» according to Programm ERASMUS

Preparation of joint applications on participation in the program Baltic Sea Region, ERASMUS.

Participation in the International projects CARMA (Circum Arctic Rangifer Monitoring and Assessment).

Cooperation with University of Northern Aiova.

Membership in Domestic and International societies, editorial boards, etc.

Sokolov B.V. –member of organizing committee of the International scientific school “Modeling and analysis of safety and risk in complex systems”; The member of program committee of Russian-German conference on logistics; The member of program committee of the conference "Cybernetics and Advanced Technologies of 21st Century"; deputy-chairman of the program committee of the conference “Simulation: Theory and Applications”; The member of the editorial boards of the journals “Logbook of Information of Higher School: Instrument-making”, “Information Technologies”; The member of Cosmonautics federation; The full member of the International Academy of navigation and motion control; The member of the association “North-West”; The member of scientific-engineering committee for establishing International global airspace monitoring system; The academic board member of the library of the Russian Academy of Sciences; expert of the Russian Academy of Sciences, RFBR expert, in 2017, 10 projects were reviewed.

Mironov V.I. – Academician of International Academy of Integrated Security.

Mikhailov V.V. – member of the National Society of simulation, Member of the Society "Russian scientists socialist orientation (RSSO)." Chairman of majoring 230400.65, 230400.62. A member of the National Society of simulation.

Zjuban A.V. – Corresponding Member of the Russian Academy of Natural Sciences.

Musaev A.A. – Member of American Mathematical Society (AMS).

Ohtilev M.Yu. – member of editors of the journal “Aerospace instrument-making”; The full member of the International Academy of navigation and motion control.

Ryzhikov Yu.I. – member of the program committee of the conference “Simulation: Theory and Applications”.

Mikoni S.V. – member of the Russian Association of Artificial Intelligence.

Verzilin D.N. – member of program committee of the conference “Simulation: Theory and Applications”

Matiash V.A. – member of the Russian Academy of Cosmonautics named after K.E. Tsiolkovsky (RAC), St. Petersburg branch.

Intellectual Property Registed in the Reporting Year

Zelentsov V.A., Potryasayev, S.A., Pimanov I.Yu., Semenov,A.E.: Software "Catalog-B" for automatic cataloging of space images. Certificate №2017612870. Registered in the registry of computer programs 03/03/2017.

Sokolov B.V., Zelentsov V.A., Potryasayev S.A., Pimanov I.Yu., Pashchenko A.E.: Distributed software complex for modeling and forecasting floods. Certificate №2017612937. Registered in the registry of computer programs 06/03/2017.

Recent Results

1. The sowtware architecture describes the basics of design and examples of practical implementation of systems (platforms) for creating and providing thematic services using Earth remote sensing data. The principal features of such systems should be, firstly, the possibility of integrating territorially distributed information resources, including heterogeneous ground-space data and calculation and analysis modules, and secondly, the fullest possible automation of these processes, ensuring interaction with untrained (in the sense of information technologies) user. It is shown that a service-oriented architecture can be the basic approach for creating such systems. Based on a comparative analysis of existing and promising information technologies, the necessary components of the Thematic Services Information Platform (TSIP) were selected. The constructiveness and feasibility of the proposed approach is demonstrated on the examples of practical testing of TSIP when creating thematic services. (Zelentsov V.A., Potryasaev S.A.) [4, 7, 11, 12].
2. In 2017 the concept of MGDO GSB adaptive management was developed. The concept is based on the main principles of applied theory of proactive managing the structural dynamics of complex technical objects that was developed by the project authors. In this case, the concept of adaptive management of the MGDO GSB should include the following phases: parametric and structural adaptation of MGDO GSB structure-dynamics control (SDC) models and algorithms to previous and current states of objects-in-service (SO), of control subsystems (CS), and of the environment; comprehensive scheduling of MGDO GSB operation (construction of SDC programs); simulation

of MGDO GSB operation, according to the schedules, for different variants of control decisions in real situations; structural and parametric adaptation of the schedule, control inputs, models, algorithms, and MGDO GSB SCS programs to possible (predicted by simulation) states of SO, CS, and of the environment. The main difference and novelty of the theoretical and practical results associated with the formation and implementation of the proposed concept and generalized procedure for the MGDO GSB adaptive management, thanks to the system-management interpretation of arising problems that was proposed by the authors, is an opportunity to describe and solve these problems from single methodological and methodical positions. Problem description and solution are based on the fundamental principles of modern systemology, neo-cybernetics and informatics which guarantee the completeness and consistency of the conclusions that were formulated and verified during the implementation of this project. (Sokolv B.V., Potryasayev S.A., Pavlov A.N.) [1, 2, 3, 7].

3. In 2017 the concept of MGDO GSB adaptive management was developed. The concept is based on the main principles of applied theory of proactive managing the structural dynamics of complex technical objects that was developed by the project authors. In this case, the concept of adaptive management of the MGDO GSB should include the following phases: parametric and structural adaptation of MGDO GSB structure-dynamics control (SDC) models and algorithms to previous and current states of objects-in-service (SO), of control subsystems (CS), and of the environment; comprehensive scheduling of MGDO GSB operation (construction of SDC programs); simulation of MGDO GSB operation, according to the schedules, for different variants of control decisions in real situations; structural and parametric adaptation of the schedule, control inputs, models, algorithms, and MGDO GSB SCS programs to possible (predicted by simulation) states of SO, CS, and of the environment. The main difference and novelty of the theoretical and practical results associated with the formation and implementation of the proposed concept and generalized procedure for the MGDO GSB adaptive management, thanks to the system-management interpretation of arising problems that was proposed by the authors, is an opportunity to describe and solve these problems from single methodological and methodical positions. Problem description and solution are based on the fundamental principles of modern systemology, neo-cybernetics and informatics which guarantee the completeness and consistency of the conclusions that were formulated and verified during the implementation of this project. (Sokolv B.V., Potryasaev S.A.).

4. As a result, of the research, we proposed new algorithms for automatic program synthesis based on a polymodel description of moni-

toring processes with the use of formal attribute grammars, discrete dynamical systems, modified Petri nets and therefore having a high degree of unification and adaptation to various types of analyzed MGDO GSB. These algorithms also differ from formerly known ones: they are based on the concepts of undetermined computations theory and programming in constraints and allow to estimate the state of MGDO GSB with a high degree of reliability even in the absence of a complete set of measured parameters values, as well as the presence of incorrect, inaccurate and unreliable information. (Sokolv B.V., Okhtilev M.Yu., Okhtilev P.A., Potryasaev S.A.) [2, 39].

5. The method of compensation (elimination) of possible erroneous actions of the robot generated by the inaccuracy of the model of the external environment in which the robot is trained is theoretically grounded and experimentally verified. This result is undoubtedly new. It makes it possible to turn the described off-line method of "bilateral" telecontrol of control into an efficient remote control method that has all the advantages of off-line control and does not have its essential disadvantages. (Kulakov F.M., Mokhailov Y.V.) [34-39,58-60].

6. The following scientific and practical results were obtained in the course of the conducted researches in the part of creating an imitation-modeling stand for the study of possible options for the operation of the MHDD. First, the development of the service bus architecture was continued, ensuring the interaction and coordination of all application software modules being developed, with the help of which both the independent and group management of the MHDD NCB is organized. Secondly, experimental samples of PM for dynamic resource management and reconfiguration of the MHDD NKB, group control of the behavior of the MHDD, as well as a full-scale model of a space robot created on the basis of a real industrial robot were developed; a sensitized glove equipped with positional and silomomentric sensors, put on the hand of the human operator; system of intellectual technical vision for the formation of visual-location information about the external environment of the robot, which must be compared with the information obtained during training to form correction signals. (Sokolov B.V., Okhtilev M.Yu., Potryasayev S.A., Kulakov F.M., Mikhailov Yu.V. [6-9, 58-60].)

7. Methodological support and experimental samples of software modules for controlling internal and external functional and structural reconfiguration of on-board equipment (BA) for small-sized spacecraft (MKA) in the nominal and specified modes of operation have been developed; analytical simulation of scenarios of redistribution of functions between the onboard and ground control complexes of the ICA; organization of calculations and experiments; multicriteria analysis of integrated indicators of reliability of the Baikal-Amur meteorological station. The scientific

novelty and practical significance of these results is that they demonstrated the constructiveness of the main provisions and conclusions developed in the laboratory of the theory of proactive control and complex modeling of SRT (Pashchenko A.E., Zelentsov V.A., Verzilin D.N., Potryasayev S.A., Pavlov A.N., Sokolov B.V.) [1, 2, 3, 16-18, 58-60].

8. Mathematical models, methods, algorithms and prototypes of program modules of intelligent proactive management of the recovering of the operability of the MCA MC have been developed. The novelty and practical significance of the results obtained is determined by the fact that it was possible to unite the models, methods, algorithms and methods previously developed for solving the problems of managing complex dynamic systems (within the framework of the classical control theory) at a constructive level, with methods and algorithms traditionally based on approaches, developed in the operation research and combinatorics. (Potryasayev S.A., Pavlov A.N., Okhtilev M.Yu., Sokolov B.V., Trofimova I.V., Zelentsov V.A.) [1, 2, 3, 16-18, 58-60].

9. Models and methods for ensuring the proactive management of critical infrastructures (CRI) in crisis situations, including the concepts of complex dynamic modeling of developing situations and managing the structural dynamics of complex organizational and technical facilities, approaches and ways of integrating heterogeneous information, data and knowledge in monitoring systems, applied methods assessing the reduction of risks of occurrence and development of man-made disasters; the methodology and algorithm for ensuring timely obtaining reliable estimates of the state of KPI, developing reasonable variants of reconfiguration of their structures under conditions of a priori uncertainty and arising contingencies, and accidents of various nature. The novelty and originality of the results obtained is determined by the fact that the authors succeeded, on the basis of the dynamic-managerial interpretation, of the processes occurring in the CI, from a unified approach to the formalization and solution of complex problems of structural and functional synthesis and management of the development of these infrastructures (Potryasaev S.A, Pavlov A.N., Sobolevsky V.A., Korotin A.A., Sokolov B.V., Zelentsov V.A., Kovalev A.P., Burakov V.V.). [1-3, 15-20, 58-60].

10. The concept of a model is formalized. General properties of models, covering models and methods, their description and execution are singled out. Based on the general properties of models, the requirements for the quality of any model are formulated. The features of models, ontological by purpose and logical-linguistic for realization, are taken into account. They include systems of concepts, classifications, semantic networks, cognitive maps, ER-diagrams of the database, block diagrams. It is shown theoretically and on examples how the quality of the ontological model depends on the quality of the definitions of the concepts included in it. (Mikoni S.V.) [73-77].

A new classification of games of two persons with zero sum and a finite number of strategies has been developed. For matrix games describing conflict situations such as "defense-attack", based on the application of strategic reflection and conducted experimental research, the rules for purposeful improvement of decisions and formation of the most preferable deterministic strategy are formulated. For the iterative Brown-Robinson method for solving matrix games, an estimate of the accuracy of the solution, applied directly during the iterative process, is derived and significantly improves the known a priori estimates. (Vorobiev A.A.) [13-14].

11. Work on the improvement of numerical methods of queuing theory, the development of the methodology of simulation modeling and multi-criteria decision-making has continued. (Ryzhikov Y.I.) [48-51].
12. The methodology of synthesizing autonomous control systems for RST objects in the direction of optimization of information support processes and management methods is developed. New theoretical solutions and software-algorithmic controls for the forward-rotational motion of special spacecraft at the stages of long-range and short-range guidance are proposed in the interests of efficient solution of target tasks. (Mironov V.I.) [28-30].
13. New methods and algorithms for statistical estimation of the parameters of the orbital motion of space objects based on the angular measurements of complexes of optoelectronic facilities and their work planning, which are part of the space control system, have been developed. (Mironov V.I.) [28-30].
14. Robust methods of predictive control in chaotic and non-stationary environments. Software robots with increased resistance to statistical variations of the interaction environment. (Musaev A.A.) [30-31].

References

Monographs, textbooks

1. Nekrasov A.G., Sokolov B.V., Atayev K.I. Life cycle management systems (transformation into digital infrastructure). Moscow: Tekhpoligratsentr, 2017. 155 p.

Papers Published in Editions Indexed by WoS, Scopus

2. Okhtilev P.A., Bakhmut A.D., Krylov A.V., Okhtilev M.Yu., Sokolov B.V. Application of decision-making support technology for management of space vehicle life cycle. ЦИ ВАКР.41-44. DOI: 10.1109/CTSYS.2017.8109483 ISBN 978-1-5386-0778-7 (Print) ISBN978-1-5386-0777-0 (Online).
3. Sokolov B., Gnidenko A., Shalyto A. Models and algorithms of operational planning and control of dynamical objects with application of the Pontryagin's Maximum principle. In: Proceedings of the 2017 IEEE 5th Workshop on Advances in Information, Electronic and Electrical Engineering, AIEEE, Latvia, Riga, 24-25 November, 2017. IEEE, 2017, pp.1-5. ISBN: 978-1-5386-4137-8.

4. Ponomarenko M.R., Pimanov I.Y. Implementation of Synthetic Aperture Radar and Geoinformation Technologies in the Complex Monitoring and Managing of the Mining Industry Objects. In: Silhavy R., Senkerik R., Kominkova Oplatkova Z., Prokopova Z., Silhavy P. (eds) Cybernetics and Mathematics Applications in Intelligent Systems. CSOC 2017. Advances in Intelligent Systems and Computing, vol 574. Springer, Cham DOI 10.1007/978-3-319-57264-2_30.
5. Skobtsov Y., Chengar O., Skobtsov V., Pavlov A.N. Synthesis Production Schedules Based on Ant Colony Optimization Method. Artificial Intelligence Trends in Intelligent Systems: Proceedings of the 6th Computer Science On-line Conference 2017 (CSOC2017). Vol.1. Series "Advances in Intelligent Systems and Computing, Volume 573. P.456-465. DOI 10.1007/978-3-319-57261-1.
6. Pavlov A.N., Pavlov D.A., Pavlov A.A., Slin'ko Al.A. The Technique of Multi-criteria Decision-Making in the Study of Semi-structured Problems. Cybernetics and Mathematics Application in Intelligent Systems: Proceedings of the 6th Computer Science On-line Conference 2017 (CSOC2017). Vol.2. Series "Advances in Intelligent Systems and Computing, Volume 574. P.131-140. DOI 10.1007/978-3-319-57264-2.
7. Sokolov B., Trofimova I., Ivanov D., Krylov A. Control Theory Application to Complex Technical Objects Scheduling Problem Solving. Cybernetics and Mathematics Application in Intelligent Systems: Proceedings of the 6th Computer Science On-line Conference 2017 (CSOC2017). Vol.2. Series "Advances in Intelligent Systems and Computing, Vol. 574. P.172-179. DOI 10.1007/978-3-319-57264-2.
8. Pashchenko A., Okhtilev P., Potrysaev S., Ipatov Y., Sokolov B. Methodology and Structure Adaptation Algorithm for Complex Technical Objects Reconfiguration Models. Cybernetics and Mathematics Application in Intelligent Systems: Proceedings of the 6th Computer Science On-line Conference 2017 (CSOC2017). Vol.2. Series "Advances in Intelligent Systems and Computing, Volume 574. P.319-328. DOI 10.1007/978-3-319-57264-2.
9. Skobtsov V., Novoselova N., Arhipov V., Potryasaev S. Intelligent Telemetry Data Analysis of Small Satellites. Cybernetics and Mathematics Application in Intelligent Systems: Proceedings of the 6th Computer Science On-line Conference 2017 (CSOC2017). Vol.2. Series "Advances in Intelligent Systems and Computing, Volume 574. P.351-361. DOI 10.1007/978-3-319-57264-2.
10. Sokolov B., Micony S., Ziuban A., Burakov V., Pimanov I., Ivanov D. Theory and practice of information fusion models' quality estimation and models' quality control.29th European Modeling and Simulation Symposium, EMSS 2017, Held at the International Multidisciplinary Modeling and Simulation Multiconference, I3M 2017 pp. 194-203.

11. Zelentsov V. et al. River Flood Forecasting System: An Interdisciplinary Approach. In: Refice A., D'Addabbo A., Capolongo D. (eds) Flood Monitoring through Remote Sensing. Springer Remote Sensing/Photogrammetry. Springer, Cham, 2017. DOI https://doi.org/10.1007/978-3-319-63959-8_4, Print ISBN 978-3-319-63958-1, OnLine ISBN 978-3-319-63959-8.
12. Zelentsov V.A., Potryasaev S.A. Architecture and Examples of Implementing the Informational Platform for Creation and Provision of Thematic Services Using Earth Remote Sensing Data. SPIIRAS Proccedings. 2017. Vol.6. #55. P. 86–113.
13. Vorobiev A.A., Daneev A.V. The modern practice of matrix games. «Far East Journal of Mathematical Sciences» (FJMS). PPH-1710130-MS.
14. Vorobyov A.A., Daneev A.V. Strategic reflection in matrix games / Proceedings of the Samara Scientific Center of the Russian Academy of Sciences. 2017. # 6.
15. Minakov E.P., Sokolov B.V., Shaldaev S.E. Investigation of the Characteristics of the Near-Moon System for Hitting Asteroids. SPIIRAS Proceedings. 2017. #5(54). P.106–129.
16. Ivanov D., Dolgui A., Boris S., Marina I. Literature review on disruption recovery in the supply chain. International Journal of Production Research. 2017. Vol.55, No.20. P.6158–6174. DOI 10.1080/00207543.2017.1330572.
17. Ivanov D., Dolgui A., Sokolov B., Ivanova M. Optimal control representation of the mathematical programming model for supply chain dynamic reconfiguration. IFAC PapersOnLine. 2017. Vol. 50-1. P. 4994–4999. DOI 10.1016/j.ifacol.2017.08.900.
18. Ivanov D., Pavlov A., Pavlov D., Sokolov B. Minimization of disruption-related return flows in the supply chain. International Journal of Production Economics. 2017. No. 183. P.503–513. DOI 10.1016/j.ijpe.2016.03.012.
19. Ivanov D., Dolgui A., Sokolov B. A Dynamic Approach to Multi-stage Job Shop Scheduling in an Industry 4.0-Based Flexible Assembly System. IFIP Advances in Information and Communication Technology (IFIP WG 5.7 International Conference on Advances in Production Management Systems, APMS 2017; Hamburg; Germany; 3 September – 7 September 2017). Volume 513, 2017, P.475-482.
20. Dolgui A., Ivanov D., Sokolov B. Ripple effect in the supply chain: an analysis and recent literature. International Journal of Production Research. 18 October 2017. P.1-17. (In Print)
21. Yury Ipatov, Alexandr Krevetsky, Yury Andrianov, Boris sokolov. Robust classification of texture land forest inventory based on model of minimally sufficient features. Journal of Applied Engineering Science. 2017. No.3. Vol.15. Part 1. P.236–241.

22. Zelentsov V., Potryasaev S., Pimanov I., Mochalov V. Intellectual information platform for thematic services creation with integrated use of ERS and in-situ data Proceedings of the International conference “Quo vaditis agriculture, forestry and society under global change?” 2017 Velké Karlovice (Czech Republic). (In Print).
23. Ivanov D., Dolgui A., Sokolov B. Scheduling of recovery actions in the supply chain with resilience analysis considerations. International Journal of Production Research. http://www.tandfonline.com/doi/full/10.1080/00207543.2017.1401747.
24. Sokolov B., Zelentsov V., Mustafin N., Kovalev A., Kalinin Vl. Methods and algorithms of ship-building manufactory operation and resources scheduling. Proceedeings of The 19th International Conference on Harbor, Maritime & Multimodal Logistics Modelling and Simulation (HMS2017), 2017, Barselona, Spain. P.81–86.
25. Sokolov B., Palitsyn V., Nazarov D. Mathematical model and algorithm of operation scheduling for monitoring situation in local waters 12th International Scientific-Technical Conference on Electromechanics and Robotics "Zavalishin's Readings" – 2017 (MATEC Web Conf.). Volume 113 (2017) 02012. https://www.matec-conferences.org/articles/matecconf/pdf/2017/27/matecconf_er2017_02012.pdf. DOI https://doi.org/10.1051/matecconf/201711302012.
26. Verzilin D., Maximova T., Sokolova I. Online Socioeconomic Activity in Russia: Patterns of Dynamics and Regional Diversity. Digital Transformation and Global Society: Second International Conference, DTGS 2017, St. Petersburg, Russia, June 21–23, 2017, Revised Selected Papers. Book Series: Communications in Computer and Information Science. Publisher: Springer International Publishing, 2017, Vol. 745, pp. 55-69. URL: https://www.springerprofessional.de/en/online-socioeconomic-activity-in-russia-patterns-of-dynamics-and/15206136
27. Sokolov B., Verzilin D., Maximova T., Sokolova I. Dynamic Models of Self-organization Through Mass Behavior in Society. Advances in Intelligent Systems and Computing. Volume 1. Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 679). Springer International Publishing AG, 2018, pp. 114-123 (DOI https://doi.org/10.1007/978-3-319-68321-8).
28. Mironov V.I., Mironov Yu.V., Makarov M.M. Optimization of the program for controlling the approach of space vehicles by the criterion of minimum energy costs in the stage of long-range guidance. SPIIRAS Proceedings. (In press).
29. Mironov V.I., Mironov Yu.V., Makarov M.M. Variational estimation of parameters of a trajectory of an orbital object by results of angular measurements. SPIIRAS Proceedings. (In press).

30. Yusupov R.M., Musaev A.A. Features of the assessment of the effectiveness of information systems and technologies. SPIIRAS Proceedings. 2017. Issue 2(51). P.5-34.
31. Sirenek V.A., Musaev A.A., Shevchik A.P. On the use of hyperbolic mass transfer equations in modeling the relaxation phenomena of diffusion in solids. Glass Phisics and Cemestry. 2017. V.43. #5. P.417-420.
32. Shevchik A.P., Sirenek V.A., Musaev A.A. Modeling of diffusion processes in glasses. Glass Phisics and Cemestry. 2017. V.43. #6. P.589-597.
33. Mikoni S.V. Formalization of definitions of concepts as a condition for improving the quality of content models. Proceedings of The XXth International conference on soft computing and measurements (SCM-2017). 24-26.05.2017. P.19-22.
34. Ignatiev M.B., Marley V.E., Mikhailov V.V., Spesivtsev A.V., Tilichko Yu.N., Spesivtsev V.A. A fuzzy-possible approach to managing urban economy in conditions of uncertainty. Proceedings of the XVI Russian Conference "Distributed Information and Computing Resources, Science to the Digital Economy" (DICR-2017) (December 4-7, 2017 Novosibirsk). (In print).
35. Mikhailov V.V., Spesivtsev A.V., Laishev K.A., Spesivtsev V.A. Logico-linguistic modeling of population systems based on expert knowledge. Материалы XVI Российской конференции «Распределенные информационно-вычислительные ресурсы, наука - цифровой экономике» (DICR-2017). 2017. (In print).
36. Mikhailov V.V., Kuzmin D.V. Development and Modelling of a Control System of Multy-joined biomedical Objects. Proceedings of the 4th International Conference on Advanced in Biomedical Engineering. Beirut, October 19-21 2017.(ICABME-2017). P.49–53.
37. Mikhailov V., Kolpaschikov L. Population Dynamics of the Taimyr wild Reindeer Herd. International Journal of Enviromental Studies. Vol. 74. 2017. Issue 5: Siberian Biodiversity, P. 862-883.
38. Mikhailov V., Klokov K. Book Review “Leaving Footprints in the Taiga: Luck, Spirits and Ambivalence among the Siberian Orochen Reindeer Herders and Hunters”. International Journal of Enviromental Studies. Vol.74. 2017. Issue 5: Siberian Biodiversity, P. 920-922.

Papers Published in Russian Editions Indexed by RSCI

39. Okhtilev P.A., Bakhmut A.D., Krylov A.V., Okhtilev M.Yu., Sokolov B.V. Approach to the estimation of structural states of complex organizational and technical objects on the basis of generalized computational models.. High technology in space exploration of the Earth. 2017. Vol.9. No5. P.73-82. (Online) (In print).
40. Matyash V.A., Ponomarenko M.R., Pimanov I.Yu. Development of methods for isolating zones of flooding based on radar survey data

for verifying the results of flood modeling [Electronic resource]. Proceedings of the Eighth All-Russian Scientific and Practical Conference "Imitation Modeling. Theory and Practice (IMMOD-2017). SPb .: Publishing House of the VVM, 2017. P.461-463.
41. Pimanov I.Yu., Ponomarenko M.R. Isolation of contours of flooded areas based on radar survey data for verification of results of short-term flood flood forecasting. Geodesy, cartography, geoinformatics and cadastres. From idea to implementation. Collection of materials of the II International Scientific and Practical Conference. November 08-10, 2017, St. Petersburg / Nauch. Ed. OA Lazebnik. SPb .: Politechnica, 2017. P. 52-57.
42. Zyuban A.V., Zelentsov V.A., Sokolov B.V. Competence centers as an organizational and technological basis for the development of the system of distributed situational centers of the Russian Federation. Economics and Management. 2017. No.6 (140). P.18-27.
43. Kalinin V.N., Sokolov B.V.. Theory of system studies as the basis of fundamental general scientific training of young scientists. Strategic priorities. 2017. No2 (14). P.127-137
44. Salukhov V.I., Sokolov B.V. The educational component in the formation and formation of a system of distributed situational centers and competence centers. Strategic priorities. 2017. No2 (14). P.138–147.
45. Zelentsov V.A., Kovalev A.P., Pimanov I.Yu., Potreasayev S.A., Semenov A.E.. Information platform for creating and providing thematic services using remote sensing data. The 7th Belorussian Space Congress: materials of the congress: in 2 volumes. - Minsk: OIPI NAS of Belarus, 2017. Vol.2, P.242-245.ISBN 978-985-6744-96-2.
46. Zelentsov V.A., Potryasayev S.A., Sokolov B.V., Skobtsov V.Yu., Kim D., Vakulchik E.N., Nikolaenya E.N., Novoselova N.V., Saxonov R.V. Distributed software package for evaluating and multicriteria analysis of reliability and survivability of on-board equipment of small space vehicles: Russian and Belarusian segments. The 7th Belorussian Space Congress: materials of the congress: in 2 volumes. - Minsk: OIPI NAS of Belarus, 2017. Vol.2, P.171-174.
47. Vorobiev A.A., Daneev A.V. Organization of the enterprise's activity in life cycle management of complex high-tech products. Baikal Research Journal. No4. 2017.
48. Ryzhikov Yu.I. The method of sweep for calculation of multichannel systems of service. Proceedings of the XVI International Conference "Information Technologies and Mathematical Modeling - ITMM-2017" (Kazan, October 2017). P.172-179.
49. Ryzhikov Yu.I. Simulation and Numerical Simulation of Queuing Systems. Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Application

in Science and Industry "Imitation Modeling. Theory and practice "(IMMOD-2017) October 18-20, 2017, St. Petersburg. P.47-57.
50. Ryzhikov Yu.I. Simulation of non-stationary service processes. Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Applications in Science and Industry "Simulation Modeling. Theory and practice "(IMMOD-2017) October 18-20, 2017, St. Petersburg. P.518-521.
51. Ryzhikov Yu.I. Pareto distribution and quantile method. Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Application in Science and Industry "Imitation Modeling. Theory and practice "(IMMOD-2017) October 18-20, 2017, St. Petersburg. P.157-161.
52. Ryzhikov Yu.I., Alekseev A.V., Lokhvitsky V.A. New facets of the possibilities of ray diagrams. Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Application in Science and Industry "Imitation Modeling. Theory and practice "(IMMOD-2017), 2017, St. Petersburg. P.125-130.
53. Balukhto A.N., Sokolov B.V. IWEBSIM - modern web technology in the field of complex modeling of complex dynamic systems. Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Applications in Science and Industry "Imitation Modeling. Theory and practice "(IMMOD-2017), 2017, P.8-17.
54. Kulakov A.Yu., Matyash V.A., Pavlov A.N., Potryasayev S.A., Sokolov B.V. Models, methods and algorithms for reconfiguring on-board spacecraft equipment in a dynamically changing environment. Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Applications in Science and Industry "Imitation Modeling. Theory and practice "(IMMOD-2017) October 18-20, 2017, St. Petersburg. P.438-442.
55. Burakov V.V., Okhtilev M.Yu., Posturyaev S.A., Kulakov F.M. Technology of complex modeling of automated process control systems by production processes. Abstracts of the 17th international scientific and practical conference "Design systems, technological preparation of production and management of the life cycle of an industrial product" (CAD/CAM/PDM-2017). P.80.
56. Sokolov B.V., Burakov V.V., Ivanov D.A. Methodology and technology to support the adoption of managerial decisions at various stages of the life cycle of complex organizational and technical facilities. Abstracts of the 17th International Scientific and Practical Conference "Design systems, technological preparation of production and management of the life cycle of an industrial product" (CAD/CAM/PDM- 2017). P.120.
57. Sokolov B.V., Pavlov A.N., Kulakov F.M., Parfenov V.G. Methodology and technologies for reconfiguration of disaster-resistant in-

formation systems.. Abstracts of the 17th international scientific and practical conference "Systems of design, technological preparation of production and management of the life cycle of an industrial product" (CAD/CAM/PDM-2017). P.121.
58. Sokolov B.V., Kolosov A.M. Planning of transport and logistics operations in space. "Logistics: current trends in development": Proceedings of the XVI International Scientific and Practical Conference, April 6, 7, 2017 P.118-121.
59. Avtamonov P.N., Bakhmut A.D., Krylov A.V., Okhtilev M.Yu., Okhtilev P.A., Sokolov B.V. Application of technology to support decision-making at various stages of the life cycle of space assets as part of the information system on the technical state and reliability. "Actual problems of rocket and space technology", "V Kozlov Readings": Collection of materials of the V All-Russian Scientific and Technical Conference with international participation in 2 volumes, September 11-15, 2017, Samara. Vol.2. P.222-233.
60. Zelentsov V.A., Potryasayev S.A., Sokolov B.V., Skobtsov V.Yu., Koryenyako S.A., Kym D.S., Vakulchik E.N., Kulbak L.I., Nikolaena E.D., Lapitskaya N.V., Saksonov R.V. Service-oriented distributed software package for evaluating and multicriteria analysis of reliability and survivability of on-board equipment of small spacecrafts: Russian and Byelorussian segments. "Actual problems of rocket and space technology", "V Kozlov readings": Collected materials of the V All-Russian Scientific and Technical Conference with international participation in 2 volumes, 2017, Samara. Vol.2. P.577-589.
61. Versilin D.N., Maksimova T.G., Antokhin Yu.N. Socio-economic and ecological indicators of the state of ecological and economic objects: genesis and development. Society: politics, economics, law. 2017. No12. URL: http://www.dom-hors.ru/vipusk-12-2017-obshchestvo-politika-ekonomika-pravo/
62. Mironov V.I., Burmistrov V.V., Makarov M.M. An analytical solution to the problem of calculating the energy-optimal control of the approach of the spacecraft. Proceedings of MSA named after A.F. Mozhaisky. 2017. No5(662). P.52-59.
63. Mironov V.I., Burmistrov V.V., Makarov M.M. Ways to increase the speed of algorithms for calculating terminal control programs for convergence ka at the stage of long-range guidance. Proceedings of MSA named after A.F. Mozhaisky. 2017. No 5(662). P.44-51.
64. Mironov V.I., Zotkin M.Yu., Rechniak A.G. Algorithm for terminal multi-step stabilization of spacecraft with angular tracking of the orbital object. Proceedings of MSA named after A.F. Mozhaisky. 2017. No5(662). P.60-67.
65. Mironov V.I., Zotkin M.Yu., Rechniak A.G. Calculation of the optimal control program for the spatial angular rotation of the

spacecraft during maneuvering in the vicinity of the orbital object. Proceedings of MSA named after A.F. Mozhaisky. 2017. No5(662). P.68-74.
66. Pavlov A.N., Pavlov A.A., Pavlov D.A., Slinko A.A. Combined method of multi-criteria choice of managerial decisions based on knowledge representation models and experiment planning. Proceedings of MSA named after A.F. Mozhaisky. 2017. Issue 656. P.9-17.
67. Pavlov A.N., Pavlov D.A., Slinko A.A. Structural-parametric synthesis of the information interaction system of a cluster of perspective small spacecrafts of Earth remote sensing and estimation of its robustness. High technology in space exploration of the earth. 2017. Vol.9. No.5. (In print)
68. Yusupov R.M., Musaev A.A. To the evaluation of the effectiveness of information systems. Methodological aspects. Information technologies. 2017. Vol. 23. No5. Pp. 323-332.
69. Musaev A.A., Zagainov A.I. The analysis of the change in the fractality of chaotic processes. Izvestiya SPbGTI. 2017. No.39(65). P.110-115.
70. Musayev A.A. Informatization of universities in Russia and abroad. Izvestiya SPbGTI. 2017. No40(66). P.89-93
71. Mikoni S.V. On the quality of ontological models. Ontology of design. 2017. Vol.7. No.3(25). P.347-360.
72. Mikoni S.V. Formalization of the criterion in the problem of multidimensional estimation of objects. Izv. universities. Instrument making. 2017. Vol.60. No.11. P.1012-1015.
73. Mikoni S.V., Degtyarev V.G. Comparison of classifications of models based on two alternative approaches. Izvestiya PGUPS. 2017. Vol.4. P.1512-1521.
74. Mikoni S.V. Role and Place of Hard and Soft Computing. Proceedings of the VIIth All-Russian Scientific and Practical Conference "Fuzzy Systems, Soft Computing and Intelligent Technologies". St. Petersburg. 3-7.07.2017. Volume 1. P. 101-109.
75. Mikoni S.V., Sokolov B.V., Yusupov R.M. On the qualimetry of models of artificial intelligence systems. Proceedings of the 10th multi-conference on the problems of control of the ICCP-2017. 11-16.09. Divnomorskoe. -Taganrog. SFU publishing house. P.79-84.
76. Mikoni S.V. Substantiated definition of the concept as a means of improving the quality of the conceptual model. Proceedings of the III Interregional Scientific and Practical Conference "Perspective directions of development of domestic information technologies" Sevastopol. 19-13.09.2017. Sevastopol: RIBEST. 2017. P. 215-216.
77. Mikoni S.V. A formalized description of the general properties of the model. Proceedings of the 8th IMMOD-2017 Conference. St. Petersburg. 18-20.10.2017. P.138-144.

78. Mikhailov V.V., Perevaryukha A.Yu. Modeling the dynamics of nutrient load in assessing the efficiency of resource reproduction. Information-control systems. 2017. №4. P.103-110.
79. Klokov K.B., Mikhailov V.V. Mechanisms of the impact of natural and social factors on the life support of local communities of reindeer herders in taiga and tundra landscapes. Ethnos and habitat. 2017. Issue 5. 2017. P.109-130.
80. Kochkarev P.V., Mikhailov V.V. Complex analysis of heavy metals in organs and tissues of wild reindeer (RANGIFER TARANDUS L. 1758). Bulletin of the Krasnoyarsk State Agrarian University. 2017. No8 (119). P.21-27.

Other Publications

81. Vorobiev A.A., Levchenko G.N., Sokolov B.V. The structure of the decision support system for the organization of command and control in modern conditions. Proceedings. of the XXth All-Russian Scientific and Practical Conference "Actual Problems of Protection and Security", section "Problems of Organization of Material and Technical Support for Military Security". 2017. Vol.7. Part 1. P.108-111.
82. Vorobiev A.A., Batov V.Yu., Filyaev M.P. The algorithm for achieving a given level of security for an air operation with known return loss parameters. Proceedings. of the XXth All-Russian Scientific and Practical Conference "Actual Problems of Protection and Security", section "Problems of Organization of Material and Technical Support for Military Security". 2017. Vol.7. Part 1. P.136-140.
83. Ryzhikov Yu.I. Queue theory - new possibilities. Proceedings of the Fourth International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems" (PCM MTMTS-2017). P.126-129.
84. Sokolov B., Potryasaev S., Merkuryev Y.A. Multiple-model description and algorithms of ship-building manufactory scheduling. Proceedings of the Fourth International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems" (PCM MTMTS-2017. pp. 137-141.
85. Sokolov B., Yusupov R., Zuban A., Semenkov O. The part, place of situational and competence centers in organization intermodal transport-logistic sea shipping. Proceedings of the Fourth International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems" (PCM MTMTS-2017). P.142-147.
86. Dolmatov M.A., Plotnikov A.M., Sokolov B.V., Burakov V.V., Pavlov A.N. System of complex modeling and optimization of performance indicators of shipbuilding enterprises. Proceedings of the Fourth International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems" (PCM MTMTS-2017). P.43-50.

87. Pavlov A.N., Ivanov D.A., Pavlov D.A., Slin'ko A.A. Modeling the structural dynamics of transport and logistics operations in the seaport. Proceedings of the Fourth International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems" (PCM MTMTS-2017). P.106-112.
88. Sokolov B.V., Nazarov D.I., Palicyn V.A. Modeling the processes of creating an automated system for monitoring the state of vessel traffic in the local water area. Proceedings of the Fourth International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems" (PCM MTMTS-2017) (June 28, St. Petersburg). P. 130-136.
89. Antokhin Y., Bogdanova E., Verzilin D., Maximova T. Skills in evidence-based decision-making for economics, innovation and health care management. Aktual'nye problemy biznes-obrazovanija: materialy XVI Mezhdunarodnoj nauchno-prakticheskoj konferencii. 2017, pp. 5-8.
90. Versilin D.N., Maksimova T.G., Antokhin Yu.N., Gorovykh E.I. Digital Transformation of the Social Space of Russian Regions: Approaches to Evaluation. Proceedings of the All-Russian Scientific and Practical Conference, 2017, IPRE RAS. SPb .: GUAP, 2017. P. 190-196.
91. Mironov V.I., Mironov Yu.V. Variational statistical processing of spacecraft trajectory measurements. XXI All-Russian scientific-practical conference "Scientific and practical aspects of space vehicles management improvement and information support of spacecraft launches", October 26-27, 2017, Krasnoznamensk. Sat. works of GIKTs them. G. Titov "Systems of control, testing and control of space vehicles." M .: GIKC, 2017. 8 p.
92. Pavlov A.N., Slinko A.A. Approach to the formation of combined operating modes of the IC system of the ICA cluster of remote sensing data. 71st Regional Scientific and Technical Conference "Student Spring-2017" - SPbGUT them. prof. M.A. Bonch-Bruevich, May 23-24, 2017 St. Petersburg: SPBGUT, 2017.
93. Pavlov A.N., Pavlov A.A., Masalkin A.A., Slinko A.A. The task of choosing a stable structure of the IC system of the ICA cluster intelligence. Proceedings (closed part) of the third All-Army military scientific conference "Problems of the application of space forces and means in the system of operations of the RF Armed Forces" - St. Petersburg: MSA named after A.F.Mozhaisky, 2017, Vol. 2. P.322-327.
94. Pavlov A.N., Ivanov D.A., Pavlov D.A., Slinko A.A. Modeling the structural dynamics of transport and logistics operations in the seaport. Proceedings of the fourth international scientific and practical conference "Simulation and complex modeling of marine equipment and marine transport systems (PCM MTMTS-2017). SPb.: SPIIRAS, 2017. P.106-112.

95. Pavlov A.N., Pavlov D.A., Masalkin A.A., Slinko A.A. Methodology and technology of resolving criterial uncertainty in qualitative analysis of managerial decisions in the situation center. All-Russian forum "System of distributed situational centers as a basis for digital transformation of public administration" (SRPS-2017), St. Petersburg, October 25-27, 2017. (In print).
96. Pavlov A.N., Pavlov D.A., Manuilov Yu.S., Slinko A.A. Planning the work of the information interaction system for a cluster of perspective small remote sensing satellites, taking into account the evaluation of its robustness. Proceedings of the XVI Russian Conference "Distributed Information and Computing Resources. Science - Digital Economy "(DICR-2017), Novosibirsk, Akademgorodok, December 4-7, 2017. (In print).
97. Pavlov A.N., Matveev S.A., Shulgin A.E., Slinko A.A. Planning of the operation of small spacecrafts of the space electronic intelligence system at the center of military-technical information using the automated control system. The 3rd All-Russian Scientific and Technical Conference "Theoretical and Applied Problems of Development and Improvement of Automated Control Systems for Military Applications", St. Petersburg. (In print).
98. Musaev A.A., Shevchik A.P. Cognitive technologies in education. Integration of education, science and industry: Collection of works of the 154th scientific and methodical conference. SPb. 2017. 179 p.
99. Mikoni S.V. Language Problems of Information Security. Materials of St. Petersburg. Interregional Conference "Information Security of Russian Regions (ISRS-2017)". St. Petersburg. 2017. P.424-426.
100. Mikoni S.V. National scientific language as the basis of information security. Materials of St. Petersburg. Interregional Conference "Information Security of Russian Regions (ISRS-2017)". St. Petersburg. 1-3.11.2017. P.241-245.
101. Mikhailov V.V., Klokov K.B., Kolpashchikov L.A., Bondar M.G. To the analysis of the bioclimatic structure of the reindeer range. Proceedings of the conference "Wildlife of the Arctic: Conservation of Biodiversity, Assessment of the State of Ecosystems" (Arkhangelsk, October 30 - November 3, 2017). P.185-186.
102. Mikhailov V.V., Ivanov N.V.Control of the walk of a walking robot based on a hybrid automaton. Proceedings of the 19th International Conference Problems of Control and Modeling in Complex Systems (PCMCS-2017), Samara, September 12-15, 2017 P.178-185.
103. Mikhailov V.V., Kuzmin D.V. Development and simulation of the system for controlling the hydraulic drives of the walking chassis. Proceedings of the 19th International Conference Problems of Control and Modeling in Complex Systems (PCMCS-2017), Samara, September 12-15, 2017. P.186-192.

Laboratory of Theoretical and Interdisciplinary Problems of Informatics

Head of the Laboratory: Dr. Phys.. and Math. Sci., Associate Professor. Alexander L. Tulupyev – representation and processing of data and knowledge with uncertainty, Data Science, Information Science, application of mathematical methods and informatics to socio-cultural research, probabilistic graphical models, Bayesian networks, methods of Biostatistics and mathematical models in Epidemiology. alt@iias.spb.su

Laboratory Staff – 9 members and 1 post-graduate student.

Research Activities

Theoretical and technological principles, algorithms and software tools for Bayesian networks, probabilistic graphical models, logic-probabilistic graphical models, relational-probabilistic models and other models based on probability and degree of belief models of cognitive systems, socio-technical systems (including information security), bio-social systems, systems for decision-making under uncertainty; theory and technology of programming; sets of methods, techniques, tools and languages for data storage, processing and analysis in interdisciplinary research; students' programming and informatics training and application of information technologies in universities; technological principles and software tools for behavior analysis in social networks.

Research Fellows

Senior researcher Dr. Med. Sci., Associate. Professor Tatiana V.Krasnoselskikh – the rationale and development of modern multidisciplinary STI prevention strategies for the high risk populations. tatiana.krasnoselskikh@gmail.com

Senior researcher Cand. Psych. Sci., Associate Professor Tatiana V. Tulupyeva – application of mathematical methods and informatics to humanities research, informatization of the psychology research management and conduct, biostatistics methods and mathematical models in epidemiology psychology of personality, psychology of management. tvt100a@mail.ru

Senior researcher Cand. Phys. and Math. Sci. Alena V Suvorova – probabilistic graphical models for modelling of the socially significant behaviour on the base of incomplete data; indirect estimates of odds ratio related to respondents' behaviour under uncertainty, machine learning in social sciences. suvalv@mail.ru

Senior researcher Cand. Tech. Sci– Artur Alexandrovich Azarov – analysis of the protection of information systems, socio-engineering attack on the users of information systems, social computing, models of information dissemination in social networks. artur-azarov@yandex.ru

Junior researcher, post-graduate student Valeriya F. Stolyarova – probabilistic aspects of the algebraic Bayesian networks theory: local learning; experiments design in epidemiology and medicine, statistical and probabilistic analysis, probabilistic graphical models and copulas in risk assesment. valerie.stoliarova@gmail.com

Junior researcher MS Aleksandra V. Toropova – evidence coherence diagnostics on models for risky behavior rate estimate, Bayesian belief networks. alexandra.toropova@gmail.com

Junior researcher MS Maksim V. Abramov – analysis of dissmination of information in social networks, based on the models, that are used for information systems' user's protection analysis from malefactor's social-engineering attacks. abramoff90@mail.ru

Junior researcher MS Ekaterina A. Malchevskaya – probabilistic logical inference in Bayesian networks: analysis, algoritmization and program realization, katerina.malch@gmail.com

Junior researcher MS Nikita A. Kharitonov – probabilistic logical inference in Bayesian networks: analysis, algoritmization and program realization, nikita.kharitonov95@yandex.ru

Post-Graduate Students

Post-graduate student Valeriya F. Stolyarova – probabilistic graphical models in methods and algorithms for analysis of risks associated with respondents' behavior. – supervised by Associate Professor. Alexander L. Tulupyev

Grants and Projects

Tulupyev A.L. – RFBR project 15-01-09001-a, Combined Probabilistic-Logic Graphical Approach to Representation and Processing of Unsertain Knowledge Systems: Algebraical Bayesian Networks and Related Models (2015–2017).

Suvorova A.V. — RFBR project No. 16-31-60063-mol-a-dk, Methods for design and evaluation of probabilistic graphical models for latent social processes (2016–2018).

Suvorova A.V. — RFBR project No. 16-31-00373-mol-a, Methods for description of social processes parameters on the base of incomplete data in terms of probabilistic graphical models (2016–2017).

University Courses

SPSU, Faculty of Mathematics and Mechanics, Computer Science Department: “Data Science: software systems”, “Finite graph theory and its applications”, “Bayesian network theory”, “LaTeX presentations and scientific publications”, “Advanced Computer Science 1” (Tulupyev A.L.).

SPSU, Faculty of Mathematics and Mechanics, Computer Science Department: “Data Science: Essentials of the data analysis and data processing”, “Human Computer Interaction”, “Technologies of Profes-

sional Communication", "Project Team Communication Psychology", "LaTeX presentations and scientific publications" (Tulupyeva T.V.).

SPSU, Faculty of Mathematics and Mechanics, Computer Science Department: "Data Science: Essentials of the data analysis and data processing", "Data Science: software systems", "Bayesian network theory", "Applied technologies for social networks analysis and modeling" (Abramov M.V.)

HSE, "Mathematcal foundations of data analysis", Data Science minor: "Programming with Data and Reproducible Research", "Data Analysis and Data Technologies", "Data Mining and Elements of Machine Learning", "Applications and Practice of Data Science" (Suvorova A.V.)

Conferences

2nd International Scientific Conference «Intelligent information technologies for industry» (IITI'17). Varna, Bulgaria, September 14-16, 2017 – Abramov M.V., Malchevskaya E.A., Suvorova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

XX International Conference on Soft Computing and Measurements (SCM-2017). Saint-Petersburg, May 24–26 2017 – Abramov M.V., Malchevskaya E.A., Suvorova A.V., Toropova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

All-Russia scientific Conference on informatics problems SPISOK-2017. Saint-Petersburg, April 25–27 2017 – Abramov M.V., Malchevskaya E.A., Suvorova A.V., Toropova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

The First All-Russian Scientific and Practical Conference «Fuzzy Systems and Soft Computing. Industrial Applications» (Fuzzy Technologies in the Industry – FTI-2017). Ulyanovsk, November 14-15, 2017 – Abramov M.V., Malchevskaya E.A., Suvorova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

VII-th All-Russia scientific-practical conference «Fuzzy systems, soft computing and intelligent technologies» (FSSCIT-2017). St. Petersburg, July 3-7, 2017 – Abramov M.V., Malchevskaya E.A., Stoliarova V.F., Suvorova A.V., Toropova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

IV-th International Summer School-Seminar on Artificial Intelligence for students, graduate students, young scientists and specialists «Intellectual Systems and Technologies: Current State and Prospects - 2017» (ISyT-2017). St. Petersburg, June 30 - July 3, 2017 – Abramov M.V., Malchevskaya E.A., Stoliarova V.F., Suvorova A.V., Toropova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

X-th St. Petersburg Interregional Conference «Information Security of Russian Regions (ISRR-2017)». St. Petersburg, November 1-3, 2017 – Abramov M.V., Malchevskaya E.A., Stoliarova V.F., Suvorova A.V., Toropova A.V., Tulupyev A.L., Tulupyeva T.V., Kharitonov N.A.;

HybridEd Workshop: Innovations in Blended Learning with MOOCs. Madrid, Spain, May 24, 2017 – Suvorova A.V.;

The Fourth Annual International conference «Education and Global Cities: Smart Learning for World Universities». St. Petersburg, May 19-20, 2017 – Suvorova A.V.;

Second International Conference «Digital Transformation & Global Society» (DTGS'17). St. Petersburg, June 21-23, 2017 – Suvorova A.V.;

Scientific-practical conference with international participation «HIV infection and immunosuppression. Epidemiology, clinic and modern strategies. Severe and comorbid forms of HIV infection». St. Petersburg, October 10-11, 2017 – Tulupyev A.L.;

20th Finnish-Russian University Cooperation in Telecommunications (FRUCT) Conference. St. Petersburg, 5-7 April 2017 – Malchevskaia E.A., Kharitonov N.A.;

All-Russian forum «System of distributed situational centers as a basis for digital transformation of public administration». St. Petersburg, October 25-27, 2017 — Tulupyev A.L., Tulupyeva T.V., Abramov M.V.

Research Management

IV-th International Summer School-Seminar on Artificial Intelligence for students, post-graduate students, young scientists and specialists «Intellectual Systems and Technologies: Current State and Prospects-2017» (ISyT–2017): deputy chairman of the Program Committee Tulupyev A.L., members of the organizing committee – Abramov M.V., Azarov A.A., Malchevskaya E.A., Suvorova A.V., Tulupyeva T.V., Kharitonov N.A.

VII-th All-Russian Scientific and Practical Conference "Fuzzy Systems, Soft Computing and Intelligent Technologies-2017" (FSSCIT-2017): deputy chairman of the program committee – Tulupyev A.L., members of the organizing committee – Abramov M.V., Azarov A.A., Malchevskaya E.A., Suvorova A.V., Tulupyeva T.V., Kharitonov N.A.

Section "Information security in social computing" of the conference ISRR-2017: section chairperson – Tulupyev A.L.

Organization of section «Probabilistic graphic models, fuzzy systems, soft computing and social computing» of the conference SPISOK-2017: section chairperson – Tulupyev A.L.

International Cooperation

Suvorova A.V., Tulupyev A.L., Tulupyeva T.V. – AITRP (AIDS International Training and Research Program), Yale School of Public Health, Yale University, USA.

OmegaWave, Inc., USA — Bayesian network applications to planning and control of sport regiment and training workload.

Membership in Domestic and International societies, editorial boards, etc.

Tulupyev A.L. – expert of the Russian Academy of Sciences, member of the Russian Association of Fuzzy Systems and Soft Computing, editorial board member of Fuzzy Systems and Soft Computing Journal, Herald of Tver State University. Series: Applied Mathematics.

Krasnoselskikh T.V. – member of St.Petersburg V.M. Tarnovsky Medical Research Association of Dermatovenerologists.

Recent Results

1. AlgBN DB database was designed and implemented in AlgBN Web App algebraic Bayesian networks project. A tool for parsing propositional formulas was developed and implemented within the framework for solving the task of local a prior inference in the mathematical library AlgBN Math Library. Theorems was formulated and proved for the tasks of local a posteriori inference sensitivity analysis. Computational experiments were carried out. Algorithms for supporting external, internal and global consistency of algebraic Bayesian networks have been refined and implemented [1, 3, 4, 8, 10, 12, 13, 24, 25, 32, 33, 35, 46, 48].
2. A software module for analyzing audio recordings of users in the social network website vk.com and offering a hypothesis about its psychological characteristics was developed. An approach for automated construction of user's vulnerabilities profile is being proposed. A prototype of a module designed to identify a number of psychological features of users based on text information that was received from a user's page in a social network website vk.com [6, 7, 23, 43, 47].
3. The architecture of the software prototype has been developed. The approaches to the algorithms constructing for finding employee accounts in the social network website vk.com were developed. The spread of the social engineering attack on the social graph of employees was presented. Restoring the meta-profile of the user on the basis of content published in social networks was worked out. An approach to constructing and analyzing the social graph of employees and an algorithm for deriving the coefficients of arcs of the social graph used were expanded [7, 9, 14, 15, 21, 36, 38, 44].
4. Compared the structures of the Bayesian Belief network for respondents' behavior rate estimate based on real data about the latest episodes of posting on social network sites. Also we suggested an approach that allows taking into account the inaccuracy of the initial data and conducted computational experiments. We developed modules of the software prototype for computational experiments [2, 5, 11, 22, 29, 42, 45].
5. Proved that copula that couples interval lengths in Poisson and gamma--Poisson models of behavior is Clayton copula. Clayton copula is Archimedian [34, 41].

References

Monographs

1. Tulupyev A.L., Tulupyeva T.V., Suvorova A.V., Abramov M.V., Zolotin A.A., Zotov M.A., Azarov A.A., Malchevskaya E.A., Levenets D.G., Toropova A.V., Kharitonov N.A., Birillo A.I., Solnitcev R.I., Mikoni S.V., Orlov S.P., Tolstov A.V. Soft computations and measurements. Models and methods: monograph. In 3 vol. Volume III / ed. Doctor of technical sciences, prof. S.V. Prokopchina. Moscow: ID "Scientific Library", 2017. 300 p.

Papers Published in Editions Indexed by WoS, Scopus

2. Suvorova A.V. Models for respondents' behavior rate estimate: Bayesian Network structure synthesis. Soft Computing and Measurements (SCM), 2017 XX IEEE International Conference. IEEE, 2017. P. 87-89 (SCOPUS).
3. Kharitonov N.A., Tulupyev A.L., Zolotin A.A. Software implementation of reconciliation algorithms in algebraic Bayesian networks. Soft Computing and Measurements (SCM), 2017 XX IEEE International Conference. IEEE, 2017. P. 8-10 (SCOPUS).
4. Zolotin A.A., Tulupyev A.L. Matrix-vector algorithms of global posteriori inference in algebraic Bayesian networks. Soft Computing and Measurements (SCM), 2017 XX IEEE International Conference. IEEE, 2017. P. 22-24 (SCOPUS).
5. Toropova A.V., Suvorova A.V. Analysis of socially significant behavior model with hidden variables. Soft Computing and Measurements (SCM), 2017 XX IEEE International Conference. IEEE, 2017. P. 50-53 (SCOPUS).
6. Abramov M.V., Azarov A.A. Identifying user's of social networks psychological features on the basis of their musical preferences. Soft Computing and Measurements (SCM), 2017 XX IEEE International Conference. IEEE, 2017. P. 90-92 (SCOPUS)
7. Bagretsov G.I., Shindarev N.A., Abramov M.V., Tulupyeva T.V. Approaches to development of models for text analysis of information in social network profiles in order to evaluate user's vulnerabilities profile. Soft Computing and Measurements (SCM), 2017 XX IEEE International Conference. IEEE, 2017. P. 93-95 (SCOPUS).
8. Zolotin A.A., Malchevskaya E.A., Tulupyev A.L., Sirotkin A.V. An Approach to Sensitivity Analysis of Inference Equations in Algebraic Bayesian Networks. Advances in Intelligent Systems and Computing. Vol. 679. Proceedings of the Second International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’17). Springer, 2018. P. 34-42.
9. Shindarev N.A., Bagretsov G.I., Abramov M.V., Tulupyeva T.V., Suvorova A.V. Approach to Identifying of Employees Profiles in

Websites of Social Networks Aimed to Analyze Social Engineering Vulnerabilities. Advances in Intelligent Systems and Computing. Vol. 679. Proceedings of the Second International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’17). Springer, 2018. P. 441-447.

Papers Published in Russian Editions Indexed by RSCI

10. Zolotin A.A., Levenets D.G., Malchevskaya E.A., Zotov M.A., Birillo A.I., Berezin A.I., Ivanova A.V., Tulupyev A.L. Algorithms for processing and visualization of algebraic Bayesian networks. Educational technologies and society. 2017. Volume 20. No. 1. P. 446-457.
11. Suvorova A.V., Tulupyev A.L. Uncertainty in estimating individual risky behavior parameters. Proceedings of scientific papers Fuzzy Technologies in the Industry – FTI-2017. (r. Ulyanovsk, November 14-15, 2017). – Ulyanovsk, UlSTU, 2017. P. 168-175.
12. Kharitonov N.A., Zolotin A.A., Tulupyev A.L. Global Consistency in Algebraic Bayesian Networks: Matrix-Vector Representation of Consistency Conditions. Proceedings of scientific papers Fuzzy Technologies in the Industry – FTI-2017. Ulyanovsk, UlSTU, 2017. P. 176-184.
13. Malchevskaya E.A., Zolotin A.A., Tulupyev A.L. Algorithms for a posteriori inference in algebraic Bayesian networks: refinement of a matrix-vector representation. Proceedings of scientific papers Fuzzy Technologies in the Industry – FTI-2017. Ulyanovsk, UlSTU, 2017. P. 371-383.
14. Suleimanov A.A., Abramov M.V. Approach to construction and analysis of the social graph of employees of a some company.. Proceedings of scientific papers Fuzzy Technologies in the Industry – FTI-2017. Ulyanovsk, UlSTU, 2017. P. 389-393.
15. Slezkin N.E., Abramov M.V., Tulupyeva T.V. Approach to reconciliation of information system user’s meta-profile based on data from social networks websites. Proceedings of scientific papers Fuzzy Technologies in the Industry – FTI-2017. Ulyanovsk, UlSTU, 2017. P. 394-399.
16. Suvorova A.V. Models for respondents' behavior rate estimate: Bayesian Network structure synthesis. Proceedings of the International Conference on Soft Computing and Measurements (SCM-2017). St. Petersburg. 2017. Vol. 1. P. 126-129.
17. Kharitonov N.A., Zolotin A.A., Tulupyev A.L. Software implementation of algorithms for maintaining consistency in algebraic Bayesian networks. Proceedings of the International Conference on Soft Computing and Measurements (SCM-2017). St. Petersburg. Volume 1-2. Vol. 1. 2017. P. 19-22.

18. Zolotin A.A., Tulupyev A.L. Matrix-vector algorithms of global posteriori inference in algebraic Bayesian networks. Proceedings of the International Conference on Soft Computing and Measurements (SCM-2017). St. Petersburg. Volume 1-2. Vol 1. 2017. P. 45-48.
19. Toropova A.V., Suvorova A.V. Analysis of socially significant behavior model with hidden variables. Proceedings of the International Conference on Soft Computing and Measurements (SCM-2017). St. Petersburg. Volume 1-2. Vol. 1. 2017. P. 81-84.
20. Abramov M.V., Azarov A.A. Identifying user's of social networks psychological features on the basis of their musical preferences. Proceedings of the International Conference on Soft Computing and Measurements (SCM-2017). St. Petersburg. Volume 1-2. Vol. 1. 2017. P. 130-133.
21. Bagretsov G.I., Shindarev N.A., Abramov M.V., Tulupyeva T.V. Approaches to development of models for text analysis of information in social network profiles in order to evaluate user's vulnerabilities profile. Proceedings of the International Conference on Soft Computing and Measurements (SCM-2017). St. Petersburg. Volume 1-2. Vol. 1. 2017. P. 138-141.
22. Suvorova A.V. Parameter Estimates for Bayesian Belief Network for Socially Significant Behavior Modelling. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference (St. Petersburg, July 3–7, 2017). v.1. SPb.: Polytechnic-service, 2017. P. 139-145.
23. Bagretsov G.I., Shindarev N.A., Abramov M.V., Tulupyeva T.V. Approaches to automation of the collection, structuring and analysis of information about employees using social network data. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. V 1. SPb.: Polytechnic-service, 2017. P. 9-16.
24. Malchevskaya E.A., Birillo A.I., Kharitonov N.A., Zolotin A.A. Development of the matrix-vector approach in algorithms of local a priori inference in algebraic Bayesian networks. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. v.1. SPb.: Polytechnic-service, 2017. P. 92-100.
25. Tulupyev A.L. Algebraic Bayesian networks and related probabilistic graphic models. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. v.1. SPb.: Polytechnic-service, 2017. P. 160-172.

26. Bushmelyov F.V., Abramov M.V. Review of software tools for visualizing networks in the microwork of corporate offices. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. v.1. SPb.: Polytechnic-service, 2017. P. 34-42.
27. Zolotin A.A., Shlyak A.V., Tulupyev A.L. Propagation of virtual stochastic evidence in algebraic Bayesian networks: algorithms and equations. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. v.1. SPb: Polytechnic-service, 2017. P. 96-107.
28. Malchevskaya E.A. Implementation of the equations of local probabilistic-logic inference in a complex of programs AlgBN Math Library. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. v.2. SPb.: Polytechnic-service, 2017. P. 125-134.
29. Toropova A.V. Hidden Variables Using in the Socially Significant Behavior Model. Fuzzy systems, soft computing and intelligent technology (FSSCIT-2017): Proceedings of the VII All-Russian Scientific and Practical Conference. v.2. SPb.: Polytechnic-service, 2017. P. 159-165.
30. Suvorova A.V. Principles of scientific data visualization. Intellectual systems and technologies: the current state and prospects.Collection of scientific works of the IV-th International summer school-seminar on artificial intelligence for students, graduate students, young scientists and specialists. SPb.: Polytechnic-service, 2017. P. 200-202
31. Abramov M.V. Estimation of probability of social engineering attacks success. Intellectual systems and technologies: the current state and prospects.Collection of scientific works of the IV-th International summer school-seminar on artificial intelligence for students, graduate students, young scientists and specialists. SPb.: Polytechnic-service, 2017. P. 9-14
32. Zotov M.A., Ivanova A.V., Zolotin A.A. Visualization of algebraic Bayesian networks using JavaScript library D3.js. Intellectual systems and technologies: the current state and prospects.Collection of scientific works of the IV-th International summer school-seminar on artificial intelligence for students, graduate students, young scientists and specialists. SPb.: Polytechnic-service, 2017. P. 86-94.
33. Malchevskaya E.A. Algorithmization of local a posteriori logical-probabilistic inference in algebraic Bayesian networks. Intellectual systems and technologies: the current state and pro-

spects.Collection of scientific works of the IV-th International summer school-seminar on artificial intelligence for students, graduate students, young scientists and specialists. SPb.: Polytechnic-service, 2017. P. 120-127.
34. Stoliarova V.F. Types and properties of dependency structures of interval lengths in Poisson and gamma--Poisson behavior models. Intellectual systems and technologies: the current state and prospects.Collection of scientific works of the IV-th International summer school-seminar on artificial intelligence for students, graduate students, young scientists and specialists. SPb.: Polytechnic-service, 2017. P. 160-166
35. Tulupyev A.L. Algebraic Bayesian networks: structure and probabilistic-logic conclusion. Intellectual systems and technologies: the current state and prospects.Collection of scientific works of the IV-th International summer school-seminar on artificial intelligence for students, graduate students, young scientists and specialists. SPb.: Polytechnic-service, 2017. P. 203-210
36. Bushmelyov F.V., Abramov M.V. Approach to the building of the attacker competencies profile in the problem of the protection of the information system from social engineering attacks. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 413–414.
37. Abramov M.V. Approach to the construction of the determining diagnostic system of personnel vulnerability to social engineering attacks. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 409–410.
38. Azarov A.A., Khlobystova A.O. Construction of the strategy for the protection of users of information systems from the social engineering attacks. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 410–411.
39. Malchevskaya E.A. Sensitivity analysis of local probabilistic-logic inference in the mathematical library AlgBNMath Library.. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 423–424.
40. Slezkin N.E., Azarov A.A. Constructing user's vulnerabilities profile on the basis of information extracted from social networks. Information security of Russian regions (ISRD-2017). X-th St. Pe-

tersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 426–427.
41. Stoliarova V.F. Automated data retrieval of interval lengths between consequent episodes from last episodes questionnarie. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 427–429.
42. Suvorova A.V., Akulshina O.D. Modelling of imprecise initial data in Bayesian belief network for socially significant behavior rate estimate. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference Proceedings of the conference. SPb: SPOISU, 2017. P. 429–430.
43. Suvorova A.V., Tulupyeva T.V. Text analysis of posts on social network site as base for user psychological profile. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 430–431.
44. Suleimanov A.A., Tulupyeva T.V., Tulupyev A.L. Construction of the social graph of the company's employees on the basis of information received from social networks to calculate the probability of success of the social-engineering attack. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 431–432.
45. Toropova A.V. Synthesis of a socially significant behavior model as a bayesian belief network with hidden variables. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 433.
46. Tulupyev A.L. Algebraic Bayesian networks as a tool for aggregation of statistical and expert information in the tasks of social computing. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. (Proceedings of the conference. SPb: SPOISU, 2017. P. 433–434.
47. Tulupyeva T.V. Express diagnostics of personality traits based on digital footprints. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 435–436
48. Kharitonov N.A. Algorithms for maintaining consistency in algebraic Bayesian networks library AlgBNMath Library. Information security of Russian regions (ISRD-2017). X-th St. Petersburg Interregional Conference. Proceedings of the conference. SPb: SPOISU, 2017. P. 436–437.

Laboratory of Applied Informatics and Problems of Society Informatization

Head of Laboratory: Corresponding Member of RAS, Honored Scientist of the Russian Federation, winner of the RF Government Prize, Honorary Academician of Tatarstan Academy of Sciences, Emeritus Professor of Military Space Academy named after A.F. Mozhaysky, Honorary Doctor of Petrozavodsk State University and of St.-Petersburg University of Management and Economics, Head of basic department at SPb Electrotechnical University "LETI", Professor of SPbSU, SPIIRAS Director, Dr. Tech. Sci., Professor Rafael M. Yusupov – scientific fundamentals of computer science, Informatization problems of society and regions, Information and National Security, Models' qualimetry. yusupov@iias.spb.su.

Laboratory Staff –15 members.

Research Activities

Scientific foundations of Computer Science, problems of development of information society in the world, countries and regions, Information and National security, immunocomputing, syntax-directed data processing, mathematical modeling and simulation of complex systems and processes, methods for the synthesis of optimal control, integrated simulation of the radiation fields of natural environments in the problems Earth remote sensing, space geoinformatics.

Research Fellows

Chief researcher Dr. Tech. Sci., Professor, Winner of the RF Government Prize Vadim P. Zabolotsky – problems of society and regions' informatization, problems of development of information society in the world, countries and regions, Information and National security. lai@iias.spb.su.

Chief researcher Dr. Phys. – Math. Sci., Professor, Honored Scientist of the Russian Federation, Winner of the RF Government Prize Oleg I. Smokty– remote sensing of the environment from space, informational providing and technology connected with the modeling for radiations fields of system "object – environment", radiative transfer theory, space geoinformatics. soi@iias.spb.su.

Leading researcher Dr. Tech. Sci., Professor Sergey A. Soldatenko – mathematical modeling of geophysical processes, the sensitivity of deterministic and stochastic dynamical systems, information support of modeling and forecasting processes occurring in the Earth system, variational methods of assimilation of information, the theory of radiative transfer, remote sensing of the Earth from space, technology and information support of modeling the natural radiation field systems, space geoinformatics, soldatenko@iias.spb.su.

Leading researcher Dr. Tech. Sci., Leonid N. Sorokin,– problems of the impact of environmental factors on information systems, ensuring reliability of spacecraft electronic equipment under the influence of space ionizing radiation, designing of the estimation methods, modeling and research of the radio receiver resistance to high-intensity electromagnetic interference and protection in emergency situations. Sorokinln@mail.ru

Leading researcher Dr. Phys.- Math. Sci. , Alexander O. Tarakanov – basic research and mathematical modeling of the principles of information processing by proteins, immunocomputing. Sea surface temperature and global modeling, and forecast. tar@iias.spb.su URL: http://www.researchgate.net /profile /Alexander_ Tarakanov/.

Senior researcher Cand. Tech.Sci. Vladislav S. Blum – Mathematical modeling and analysis of primary medical information flows, as well as problems of security for Public Health. vlad@blum.spb.su, lai_spiiras@iias.spb.su.

Senior researcher Cand. Tech. Sci. Ludmila N.Fedorchenko – syntax-directed data processing; methods and algorithms of grammar regularization; parsing; tools Syntax Graph Transformations. lnf@iias.spb.su.

Senior researcher Cand. Tech. Sci. Vladimir P. Ivanov – mathematical modeling of complex processes and optimal control of systems, applications of the special method to applied problems of aircraft control, game control problems. vpivanov.spb.su@gmail.com.

Senior researcher Cand. Tech. Sci., Associate Professor Mikhail V. Kharinov – representation of information, information quantity estimation, invariant image representation in intensity space, reversible pixel clustering and image segmentation, optimal image simulating by piecewise constant appoximations, hierarchical data structures, unified algorithms for audio and video signal processing for their storage, processing and transmission, color transformations of images., problem of optimal image simulating by means of piecewise constant approximations, net-wise software tool based on Sleator-Tarjan dynamic trees and associative loops. khar@iias.spb.su, http:www. machinelearning.ru/ wiki/index.php?title=user: Khar

Senior researcher Cand. Tech. Sci. Andrey Yu.Perevarukha – nonlinear dynamics of the models for biological processes. Temp_elf@mail.ru.

Senior researcher Cand. Tech. Sci two times Winner of the RF Government Prize Mikhail A. Vus – information society challenges, Information and National Security, norms of the law in informatics, legal aspects of the international relations and security. mixail-vys@yandex.ru.

Junior researcher MS Igor G. Khanykov– methods and data structure for image analysis and recognition. igorioniak@mail.ru, igk@iias.spb.su

Grants and Projects

Yusupov R.M., Blum V.S., Fedorchenko L.N., Ivanov V.P., Perevarukha A.Yu., Smokty O.I., Soldatenko S.A., Sorokin L.N., Tarakanov A.O., Vus M.A. – Project FASO Russia (The Federal Agency for Scientific Organizations) № AAAA–A16–116051250009–8. “Status and prospects for the development of the information society in Russia”.

Yusupov R.M. – Grant RFBR 16-29-09482. "Forecasting information network of terrorist threats and justification of measures to counter them in megacities ".

Yusupov R.M., Blum V.S., Fedorchenko L.N. – IPA CIS Project No. M3-44.17 "Recommendations "On the Ethics of Nanotechnology".

Sorokin L.N. – International project – IP of research "Monitoring – SG" – Development of methodological support and experimental software for the analysis and prediction of reliability characteristics of the onboard equipment small-sized spacecraft at the different stages of the life cycle ", stages 5.

Perevarukha A.Yu. – Grant RFBR 17–07–00125 Development of modeling methods for population outbreak scenarios during the invasion of insects on the basis of continuous-discrete computational structures.

Perevarukha A.Yu, Solovieva T.N. – Grant RFBR 16–37–00028 Development computational event-driven model for the effectiveness of the Caspian stellate sturgeon reproduction in the conditions of uncertainty reproductive isolation of subpopulation groups.

University Courses

The Head of base chairs: “Information technology and computer security” (Saint Petersburg Electrotechnical University 'LETI'), "Distributed Intelligent systems of automation" (St.Petersburg Polytechnic University- SPbPU), Professor of Computer Science Chair (Math-Mech, SPbSU). General lectures and seminars in 'LETI' and in SPbSUAI. The Chairman of the Dissertation Council in SPIIRAS – Yusupov R.M.

SPSUAI: Lectures of Assistant Professor: "Information Technology in Business", "Information Search System", "Linguistic Support of Information Systems", "Intelligent information systems". – Blum V.S.

SPSUAI: base Department of robotics: Lectures of Assistant Professor “Base Studies in Robotics”, “Control robots and robotic systems”, “Aero and Space Robots”, “Software telemedicine networks” – Ivanov V.P.

SpbSU: Math.-Mech. faculty. Department of Computer Science. Lectures of Assistant Professor: ”Theory of Formal languages and Translations” and practical lessons on the course of lectures. – Fedorchenko L.N.

SPbPU Peter the Great: The Institute of military-technical education and security. Department "Management and protection in emergency situations". Lectures of Professor: "Protection in emergency situations", "Protection of NPP personnel and the public from ionizing

radiation", "Safety management of natural and technical systems", “Management of liquidation of emergency situation on radiation and chemically dangerous objects” – Sorokin LN.

Conferences

Jubilee X Saint-Petersburg Interregional Conference "Information Security Regions of Russia (ISRR-2017)", November 01–03 2017, Saint-Petersburg, Russia – Yusupov R.M., Zabolotsky V.P., Blum V.S., Fedorchenko L.N., Ivanov V.P., Kharinov M.V., Perevarukha A.Yu, Vus M.A. Web site: http://www.spoisu.ru/.

International Scientific and Historical Conference "Aviation for Partisans in the Years of the Great Patriotic War of 1941–1945", April 28–29, 2017, Minsk, Republic pf Belarus – Ivanov V.P.

XI All-Russian Scientific and Practical Conference "Problems of Ensuring Explosion Safety and Counteracting Terrorism" April 12–14, 2016, St. Petersburg, Russia – Sorokin L.N.

Second International Conference on Stochastic Methods, May 25–31, 2017, Novorossiysk, Russia – Perevarukha A.Yu.

XVII All-Russian Conference-School of Young Researchers "Modern Problems of Mathematical Modeling", September 11–16, 2017, Dyurso settlement, Krasnodar Territory, Russia – Perevarukha A.Yu.

International Scientific Conference "Ordinal Analysis and Related Matters of Mathematical Modeling", July 3–8, 2017, settlement Tsei, Republic of North Ossetia – Perevarukha A.Yu.

The Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Applications in Science and Industry "Imitation Modeling. Theory and practice"(IMMOD–2017) – Perevarukha A.Yu.

V International Baltic Forum. XV International Scientific Conference "Innovations in Science, Education and Enterprise–2017", May 21–27, 2017. Kaliningrad, Russia – Fedorchenko L.N.

10th International Conference on Security of Information and Networks (SIN–2017), October 13–15, 2017. Jaipur, India – Fedorchenko L.N.

International Conference "Polynomial Computer Algebra'2017", 17–22 April, 2017, St. Petersburg, Russia. – Fedorchenko L.N.

International Cooperation

Institute of National Security of the Republic of Belarus and the Academy of Ministry of Internal Affairs of Belarus –joint work and publications carried out according to the plans of the IPA CIS and CSTO PA. – Vus M.A.

Research Management

SPIIRAS Director, President of the National Society on simulation, Chairman of the Joint Scientific Council SPbNTs Academy of Sciences in Computer Science, Telecommunications and Management, Deputy

Chairman of the Scientific Council for Informatization of St. Petersburg, co-chair of the Partnership Coordination Council for Information Society Development in the North-West of Russia, Honorary Doctor of Petrozavodsk State University, an honorary doctor of the St. Petersburg University of Management and the economy, the president of the National Society for Simulation Modeling – Yusupov R.M.

Organization and holding of the Jubilee X Saint-Petersburg Interregional Conference "Information Security of Russian Regions (ISRR-2017)", 01–03 November 2017, St. Petersburg – Yusupov R.M., Fedorchenko L.N.

Defense of Thesis

Panarina A.V. – "Investigation of thermal processes in nuclear reactors of LWR –type (Light Water Reactor) in the event of an accident with loss of coolant and justification of recommendations for ensuring their explosion safety". Master degree in the direction of 20.04.01 – “Technosphere safety“ (Master's program "Physics and technological problems of safety"), SPbPU Peter the Great. – The Head is the doctor of technical sciences – Superviosed by Sorokin L.N.

Membership in Domestic and International organizations, editorial boards of journals, etc.

Yusupov R.M. – member of the Scientific Council of the Russian Academy of Sciences "High-performance computing systems, scientific telecommunications and information infrastructure; Member of RAS Scientific Council on Theory of Control Process and Automatization; Member of Russian National Committee on Industrial and Applied Mathematics; Honorary Professor of the Military Space Academy named after A.F. Mozhaysky; Member of the Russian National Committee for Industrial and Applied Mathematics; Member of the Advisory Council for the preparation of the teaching staff at the State Duma Committee on Education, Member of North-West Section coordination council of RAS on fundamental and applied research; Member of the editorial committee of the international journal "Current problems of aviation and aerospace systems"; Member of Editorial Boards of Magazines: “Warfare, Politics, Conversion”, “Computer Science and its Applications”, “Telecommunications”, "Information and Control Systems", “Mehatronics, Automation, and Control”, International Magazine “The Problems of Control and Computer Science”, Journal of Intelligent Control Neurocomputing and Fuzzy Logic" (USA), “Cybernetics and information technologies Bulgarian Academy of Sciences”, "Control systems and machines"(Kiev, Ukraine), "Information and Space", The Journal of the University of Water Communications, etc.

Fedorchenko L.N. – Scientific Secretary of the SPIIRAS city seminar "Informatics and Computer Technologies." Web site: http://conference.spiiras.nw.ru/seminar_ICT/

Ivanov V.P. – Corresponding Member of Aviation Academy, Member of the Russian National Community of Science History Society (St. Petersburg department), Member of the Writers' Union of the Russian Federation, Responsible Editor at publishing house “Politechnika”.

Kharinov M.V. – Official representative of SPIIRAS in National Association of Innovations and Information Technologies (NAIIIT). Official revewer of the journal Computer Science and Engineering (p–ISSN: 2163–1484,e–ISSN: 2163–1492).

Vus M.A. – Member of the Academy of Informatization of Education and a member of the All-Russian Central Executive Committee of Pedagogical Assembly and a member of the Editorial Board (scientific editor of some issues) of the journal "Informatization and Communication. The magazine is included in the base “Russian Science Citation Index and in the WAK list (Higher Certification Commission).

Intellectual Property Registed in the reporting year

Patents for inventions and utility models

Dmitriev I.Yu., Ivanov, V.P., Eliashevich, G.K., and other. The executive device. Patent for utility model №175482.

Grishchenko S.A., Nesterov, A.G., Motchalov, V.V., Sorokin, L.N. "The device for calibration of the dynamic pressure sensors". / The patent for the invention №169303 on 14 March 2017 at the application 2016137364/28 on 19.09.2016. Priority on 19.09.2016.. Newsletter №8 on 20.03.2017.

Recent Results

1. The problem of optimal control of the terrestrial climate system as a complex adaptive dynamic system is formulated and a method for selecting control parameters in problems of optimal control of unstable geophysical currents is developed, a model of the climatic system and a model for estimating the influence of various classes of observations on the quality of forecasting the trajectories of dynamical systems. The climate engineering is formulated as an optimal control problem, in which the earth’s climate system is considered as a closed-loop dynamical system. The necessary conditions for optimality have been obtained. By the use a low-parametric climate model, quantitative estimates of the effect of artificial stratospheric aerosols on the earth’s climate have been obtained, which confirm the feasibility of stabilizing the climate by injection of tiny aerosol particles into the stratosphere. The solution of the optimal control problem for the earth's climate system is obtained on the basis of zero-dimensional climate model using the Pontryagin’s maximum principle [1, 5, 6, 60].
2. Numerical models of radiation fields of natural media have been developed on the basis of the use of the principle of mirror mapping and solutions of linear integral singular equations. The theory of the for-

mation of weak spectral lines of the "atmosphere-underlying surface" system is constructed, taking into account the polarization of the scattered radiation. New structural functions for atmospheric radiation fields are determined on the basis of the principle of mirror image [55–59].

3. The stability of ultrahigh-frequency semiconductor devices and radio receivers of the decimeter and centimeter wavelength ranges to directional and random pulsed electromagnetic influences of various frequency, duration, and shape is investigated. by experimental, analytical and numerical methods. The specific of the impacts of the radio-frequency ultra wideband radiation are determined. The range of broadband and narrow-band radio receivers damage by radiators of powerful single and periodically following electromagnetic pulses is estimated. New methods for increasing the resistance of the radio frequency unit to electromagnetic influences are analyzed and the energy efficiency of their application is estimated [2].

4. The mathematical model of fuel element heating has been specified and numerical simulation of thermal processes in the active zone of water power reactors (on light water) (LWR- light water reactor) in case of loss-of-coolant accidents, as well as the processes of hydrogen evolution in the steam-zirconium reaction was carried out. Regularities in the temperature of fuel elements and the amount of hydrogen formed after an emergency stop of a LWR–1000 type reactor have been studied. The possibility of an explosion of a mixture of hydrogen with air in the building of power units of LWR-1000 reactors at accidents with loss of coolant [49–51].

5. Methodical support and an experimental sample of the software module "Radiation" for the analysis of the reliability and hardness of onboard equipment of small-size spacecraft at the stages of their design and development, taking into account the impact of radiation factors of space. Based on the results of the tests, the software module "Radiation" was included in the Russian segment of the experimental sample of the distributed software and hardware complex for analysis and prediction of the reliability characteristics of onboard equipment of small-size spacecraft at various stages of the life cycle [52].

6. A dynamic model is developed for the emergence and spontaneous completion of a dangerous phenomenon - a specific explosion-like increase in the population size of a vulnerable Hemiptera insect phytophagous. The scenario is realized for the autochthonous pest of the psyllid species Cardiaspina albitextura, which affects the eucalyptus forests of the East of Australia in the form of single outbreaks of small insects that cause defoliation of forest plantations. The outbreak of insects separates two intervals of unstable aperiodic oscillations, the duration of which depends on the choice of the initial position of the

trajectory. The main phase of the outbreak starts from an almost stabilized state after overcoming the threshold equilibrium that arises from the complexity of the interspecific interaction of Hymenoptera parasites of the first and second orders [10, 29–40].

7. The strongest in this century cool sea surface temperature (SST) anomaly of the tropical Pacific (so called La Niña) has been detected this Autumn 2017 near the Galapagos Islands. Almost similar but not so cool La Niña by the end of 2007 preceded the world fall of oil prices and the global economic crisis in 2008. The results were obtained by the original SST-simulator software utilizing the global daily SST data from NOAA [3, 11–13].
8. The Model Law of the CSTO "On State Secrets" has been developed [17-20].
9. A dynamic model of complete and reliable medical information was developed together with a method of visualization in three dimensions of time series of electronic personal medical records.[47, 48, 53].
10. A network dynamic data structure for object detection on digital images was developed, and methods for improving any hierarchical clustering of color image pixels have been investigated [14, 44-46].
11. A method for synthesizing executive devices of robotics and automation on swelling polymers has been developed [7–9, 28, 54].
12. The algorithm for automatic generation of tests for parser verification was developed, It is implemented in the tool SynGT. The technique is based on a generation of prototypes extracted from the syntactic graph scheme, which is a graphic analog of the context-free grammar in a regular form [15, 41, 42].
13. Within the framework of the project with the IPA Secretariat of the CIS member states, the concept of Recommendations "On the Ethics of Nanotechnologies" was developed, which was presented at the IPA Secretariat meeting on November 16, 2017 and it was approved.

Awards

Vladimir P. Ivanov. – Commemorative medal "75 years of the partisan movement during the Great Patriotic War of 1941–1945" for active participation in military-patriotic education of youth.

References

Books and book chapters

1. Yusupov R.M., Soldatenko S.A., Chapter 5. «Predictability in Deterministic Dynamical Systems with Application to Weather Forecasting and Climate Modelling». In «Dynamical Systems – Analytical and Computational Techniques». Publisher: InTech, Rijeka, Croatia, 2017, 272 p. pp.101–122. doi: 10.5772/66752
2. Usychenko V.G., Sorokin L.N. Hardness of microwave receivers to electromagnetic impacts. Book. – Moscow: Radio Engineering, 2017. 288 p.: 16 p. color. yl. (Russ.).

3. Tarakanov AO, Borisova AV (2017) Immunocomputing and Baltic indicator of global warming. In: Adamatzky A (Ed) Advances in Unconventional Computing. Emergence, Complexity and Computation, vol. 23, pp. 763–771. Springer Switzerland.

Papers Published in Editions Indexed by WoS, Scopus

4. Yusupov R.M., Musaev A.A. Osobennosti ocenivanija jeffektivnosti informacionnyh sistem i tehnologij. Trudy SPIIRAN. 2017. Vyp. (2)51. C. 5–34. (In Russ.)
5. Soldatenko S.A., Yusupov R.M. Sensitivity and Feedback Loops of Zero-Dimensional Climate Model in the Context of Weather and Earth's Climate Control. Proceedings of the SPIIRAS. 2017. V. 53. N 3.P. 5–31.
6. Soldatenko S.A. Weather and climate manipulation as an optimal control for adaptive dynamical systems. Complexity.2017, Article ID 4615072, 12 pages https://doi.org/10.1155/2017/4615072
7. Ivanov V.P. Method of synthesis of special control for autonomous systems / V.P. Ivanov, A. Morozova, V.A. Shkaberin / 2nd International Conference on Industrial Engineering, Applications and Manufacturing (ICIEAM) Chelyabinsk, 2016. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7911648&isnumber=7910885.
8. Ivanov V.P., Dmitriev I.Ju., El'jashevich G.K. Iskusstvennye myshcy na osnove nabuhajushhih polimerov. S.332–334. / Mezhdunarodnyj kongress Biotech World 2017. 20–22 fevralja 2017. Moskva. Materialy Kongressa. T.2. M.: 2017. 596 p. (In Russ.).
9. Dmitriev I.Ju., Bobrova N.V., Ivanov V.P., El'jashevich G.K. Jelektroupravljaemyj jelement ispolnitel'nogo ustrojstva na osnove gidrogelja. Patent for utility model №175272.
10. Perevaryukha A.Yu. Comparative modeling of two especial scenarios of bioresources collapses: Canadian Atlantic cod and Caspian sea sturgeon. Journal of Automation and Information Sciences. 2017. Vol. 49. №6. P. 22–34
11. Borroto-Escuela DO, Tarakanov AO, Bechter K, Fuxe K (2017) IL1R2, CCR2 and CXCR4 may form heteroreceptor complexes with NMDAR and D2R: Relevance for schizophrenia. Frontiers in Psychiatry 8:24, 1–8.
12. Borroto-Escuela DO, Carlsson J, Ambrogini P, Narváez M, Wydra K, Tarakanov AO, Li X, Millon C, Ferraro L, Cuppini R, Tanganelli S, Liu F, Filip M, Diaz Cabiale Z, Fuxe K (2017) Understanding the role of GPCR heteroreceptor complexes in modulating the brain networks in health and disease. Frontiers in Cellular Neuroscience 11:37, 1–20.

13. Borroto-Escuela DO, Li X, Tarakanov AO, Sayelli D, Narváez M, Shumilov K, Andrade-Talavera Y, Jimenes-Beristain A, Pomierny B, Díaz-Cabiale Z, Cuppini R, Ambrogini P, Lindskog M, Fuxe K (2017) Existence of brain 5–HT1A–5–HT2A isoreceptor complexes with antagonistic allosteric receptor-receptor interactions regulating 5–HT1A receptor recognition. ACS Omega 2:4779–4789
14. Khanykov I.G., Kharinov M.V., Patel C. Image Segmentation Improvement by Reversible Segment Merging. IEEE icSoftComp–2017: 2017 International Conference on Soft Computing and its Engineering Applications, at CHARUSAT, Changa, Anand, India, December 1–2, 2017.
15. Novikov F., Fedorchenko L., Vorobiev V., Fatkieva R., Levonevskiy D. Attribute-Based Approach of Defining the Secure Behavior of Automata Objects. Proceedings of the 10th International Conference On Security Of Information And Networks (SIN–2017), Jaipur, India, October 13–15, 2017.

Papers Published in Russian Journals and Editions Indexed by RSCI

16. Yusupov R.M., Bachilo I.L. and Co. Pravovoj vektor obespechenija informacionnoj bezopasnosti v Model'nom zakonodatel'stve SNG. Dialog. Politika. Pravo. Jekonomika. № 2(5), 2017, Sankt-Peterburg.
17. Yusupov R.M., Vus M.A. O gosudarstvennoj tajne: istorija i sovremennost' . Peterburgskaja bibliotechnaja shkola. 2017. № 1. pp. 77–81.
18. Yusupov R.M., Vus M.A. Institute of state secrets: post- soviet space. Management Consultation, № 4, 2017, pp. 8–13.
19. Yusupov R.M., Vus M.A. Proekt Model'nogo zakona ODKB «O gosudarstvennoj tajne». Doklad. Mezhdunarodnaja nauchno-prakticheskaja konferencija «Problemy obespechenija nacional'noj i gosudarstvennoj bezopasnosti: pravovye i informacionnye aspekty». 2.11.2017. Minsk.
20. Yusupov R.M., Vus M.A. K voprosu o Model'nom zakone Organizacii Dogovora o kollektivnoj bezopasnosti «O gosudarstvennoj tajne». Sbornik materialov Mezhdunarodnoj nauchno-prakticheskoj konferencii «Pravo i informacija: voprosy teorii i praktiki», 15.04.2016 g. SPB, Prezidentskaja biblioteka.
21. Yusupov R.M., Sokolov B.V. i dr. Metodologicheskie i metodicheskie osnovy razrabotki i vnedrenija integrirovannyh sistem podderzhki prinjatija reshenij (SPPR) v ASU ob#ektami voenno-gosudarstvennogo upravlenija. Informacionnye vojny. 2017, № 1(41), pp.39–48.
22. Yusupov R.M., Sokolov B. V. Methods and algorithms for estimation and management of the complex objects' models quality.// International scientific and practical conference "175 years of

D.I. Mendeleev Metrological Institute and of establishing the National system of measurements' uniformity", St. Petersburg, Russia, June 14-15, 2017.
23. Yusupov R., Sokolov B., Zuban A. The part, place of situational and competence centers in organization intermodal transport-logistic sea shipping operation.. Trudy konferencii «Imitacionnoe i kompleksnoe modelirovanie morskoj tehniki i morskih transportnyh sistem». 28 ijunja 2017 g., SPb.
24. Yusupov R.M., Zelencov V.A., Ohtilev M.Ju., Sokolov B.V. Aktual'nye nauchno-tehnicheskie problemy razrabotki sistem prinjatija reshenij. Sbornik dokladov VI ezhegodnogo foruma «Informacionnye tehnologii na sluzhbe oboronno-promyshlennogo kompleksa», Izhevsk, 20–22 ijunja 2017 g.
25. Yusupov R.M., Kasatkin V.V., Sokolov B.V., Ohtilev M.Ju. Analiz vlijanija informacionnyh tehnologij na jeffektivnost' sistem upravlenija slozhnymi ob#ektami. Sevastopol', 2017, str. 14–18.
26. Yusupov R.M., Sokolov B.V., Saluhov V.I. Informacionno-metodicheskoe obespechenie funkcionirovanija sistemy raspredelennyh situacionnyh centrov i centrov kompetencij.. Materialy III mezhregional'noj nauchno-prakticheskoj konferencii «Perspektiva napravlenija razvitija informacionnyh tehnologij», Sevastopol', 19–23 sentjabrja 2017 goda, s.10–14.
27. Yusupov R.M., Musaev A.A. K ocenivaniju jeffektivnosti informacionnyh sistem. Metodologicheskie aspekty.. Informacionnye tehnologii. 2017, tom 23, № 5, s.323–332.
28. Dmitriev I.Ju., El'jashevich G.K., Ivanov V.P. Principy postroenija iskusstvennyh myshc na osnove nabuhajushhih polimerov. / Mezhdunarodnaja nauchno-tehnicheskaja konferencija PromInzhiniring. St. Peterburg, 16–19 May 2017.
29. Perevaryukha A.Yu. Model of the scenario of the population crisis as a result of the Andronov-Hopf bifurcation. Dynamic systems. 2016. Vol. 6 (34). № 2. P. 149–159. (In Russ)
30. Perevaryukha A.Yu. Nonlinear model of overfishing of Volga populations based on the cognitive graph of interaction of environmental factors. Bulletin of the Samara University. Natural science series. 2016. № 1–2. P. 92–106.
31. Perevaryukha A.Yu. Degradation of commercial fish stocks: the experience of scenario modeling (on the example of the cod of the North Atlantic). Izvestiya Irkutsk State University. Series: Biology. Ecology. 2016. Vol. 15. P. 55–67.
32. Perevaryukha A.Yu. Destruction of relaxation oscillations in a new model of extreme population dynamics. Bulletin of Volgograd State University. Series 1: Mathematics. Physics. 2017. № 1(38). P. 55–65.

33. Perevaryukha A.Yu. Transition from relaxation oscillations to a pseudoperiodic trajectory in a new model of population dynamics. Applied nonlinear dynamics. 2017. Vol. 25. № 2. P. 51–62.
34. Perevaryukha A.Yu. About a technique of modeling ontogenetic changes in a life cycle of fishes and insects. System analysis and applied computer science. 2017. № 1 (13). P. 12–23.
35. Perevaryukha A.Yu. Model of extreme scenarios of population dynamics with a factor of non-optimal individual growth rate. Mathematical machines and systems. 2017. № 3. P. 120–132
36. Mikhailov V.V., Perevaryukha A.Yu. Modeling the Dynamics of Biogenic Pressure in Evaluating the Efficiency of Replenishing Bioresources. Information-Control Systems. 2017. Vol. 89. № 4. P. 103–110.
37. Mikhailov V.V., Perevaryukha A.Yu. Model of the scenario of juvenile fish introductions taking into account the dynamics of biogenic elements. System analysis and applied informatics. 2017. № 2. P. 20–28.
38. Solovyeva T.N., Perevaryukha A.Yu. Model of the scenario of degradation of the Caspian stellate sturgeon with an oscillating component of population dynamics. Information-control systems. 2017. № 6. P. 58–65.
39. Dubrovskaya V.A., Perevaryukha A.Yu. Nonlinearity of the rates of individual development as a detonator of extreme population dynamics. Problems of Mechanics and Control. Nonlinear dynamical systems. 2017. Vol. 49. P. 8–16.
40. Borisova T.Yu., Perevaryukha A.Yu., Solovyova I.V. Problem aspects of modeling of population processes and the criteria for their harmonization. Mathematical machines and systems. 2017. № 1. P. 71–81.
41. Fedorchenko L.N. Generation of tests in the system SynGT. Bulletin of Buryat State University. Mathematics, computer science. №2. Ulan-Ude: Buryat State University, 2017. pp. 33–39.
42. Fedorchenko L.N. Algorithms for constructing parser states for CFR language. Bulletin of Buryat State University. Mathematics, computer science. 2016. №4. pp. 23–33.
43. Lukyanova L.M., Fedorchenko L.N. Formalization of the target language for complex production systems.. V International Baltic Forum. XV International Scientific Conference "Innovations in Science, Education and Entrepreneurship–2017": Abstracts. Part 2. Kaliningrad: Publishing House of the BFFSA, 2017, pp. 221. pp. 63–65.
44. Khanykov I.G., Kharinov M.V. A digital image model based on the modified Ward method of pixel clustering. Bulletin of BSU. Math-

ematics. Computer science. No 2, 2017. pp. 61–70. doi:10.18101/2304–5728–2017–2–61–70. http://journals.bsu.ru/content/files/articles/article_716.pdf.
45. Khanykov I.G., Kharinov M.V. Clustering pixels of the color image by Ward's method. Proceedings of the Conference on Computer Graphics and Vision, GraphiCon 2017, September 24–28, 2017, Perm', pp.232–235. http: www.graphicon.ru/html /2014/papers/123–126.pdf.
46. Yudin I., Khanykov I.G. Model of recognition of road signs and pedestrians in a video stream. abstracts, Scientific session of TUSUR–2017: Proceedings of the International scientific and technical conference of students, graduate students and young scientists dedicated to the 55th anniversary of TUSUR,Tomsk, May 10–12, 2017. Tomsk: B–Spectrum, 2017 2017 P. 4. 256 c. https://storage.tusur.ru/files/61044/2017_4.pdf
47. Blum V.S., Inkin V.A. Method of visualization of the mathematical model of the base of integrated electronic medical maps.. Actual problems of economics and management. Issue 2 (10). 2016, pp. 88 – 94.
48. Blum V.S. Model and method of monitoring the information flow in the clinical healthcare field.. Abstracts of the Second Russian–Pacific Conference on Computer Technologies and Applications, RPC (Vladivostok, 2017, September 25–27) ISBN: 978–1–5386–1206–4, 2017. pp. 170–171.

Other Publications

49. Sorokin L.N., Basenko V.G., Panarina A.V. Simulation of hydrogen release in LWR-type nuclear reactors in the event of a loss of coolant accident. Proceedings of the XI All-Russian Scientific and Practical Conference "Problems of Ensuring Explosion Safety and Counteracting Terrorism", April 12–14, 2016. SPb.: 2017. Vol. 1. pp. 194–200.
50. Software for calculating and multicriteria analysis of reliability and survivability of on-board equipment spacecraft / Zelentsov V.A., Mironov A.N., Pavlov A.N., Pashchenko A.E., Posturyaev S.A., Sokolov B.V., Sorokin L.N.. In the book: "Management of Large-Scale System Development (MLSD'2016)". Materials of the Ninth International Conference: in 2 volumes. Under the general editorship of S.N. Vasilieva, A.D. and Tsvirkuna, 2016. pp. 262–263.
51. Sorokin L.N. Educational and methodological manual for the preparation of final qualification works (the direction of preparation of "Technospheric Security") / L.N. Sorokin, EP Ryabinina, A.Yu. Tumanov. SPb.: Publishing house of Polytechnic. Univ., 2017. pp. 64.

52. Sorokin L.N. Fundamentals of terrestrial and space monitoring of emergency situations: Proc. allowance. SPb.: Publishing house of Polytechnic. University, 2017. pp. 197.
53. Blum VS Information security conditions in the clinical field of the health system.. Abstracts of the reports of the St. Petersburg Interregional Conference "Information Security of Russian Regions (ISRR–2017)", SPb, 2017. P.254.
54. Ivanov V.V. & ets. Hybrid hydrogels based on cross-linked polyacrylic acid and polyvinyl alcohol as electrically controlled artificial muscles / Russian Journal of Applied Chemistry, 89(11), 1838–1845. – 2017–02–27.
55. Smokty O.I. Application of mirror reflection principle for numerical modeling of uniform slab brightness coefficients by using linear singular integral equations, В сборнике: AIP Conference Proceedings Radiation Processes in the Atmosphere and Ocean. Сер. "Radiation Processes in the Atmosphere and Ocean, IRS 2016: Proceedings of the International Radiation Symposium (IRC/IAMAS)" 2017.
56. Smokty O.I.Theory of weak spectral lines formation in response to polarized radiation within an "atmosphere – underlying surface" system. В сборнике: AIP Conference Proceedings Radiation Processes in the Atmosphere and Ocean. Сер. "Radiation Processes in the Atmosphere and Ocean, IRS 2016: Proceedings of the International Radiation Symposium (IRC/IAMAS)" 2017. pp. 040007
57. Smokty O.I. Analytical approximation for homogeneous slab brightness coefficients: case of strongly elongated phase functions. In Procs: AIP Conference Proceedings Radiation Processes in the Atmosphere and Ocean. Сер. "Radiation Processes in the Atmosphere and Ocean, IRS 2016: Proceedings of the International Radiation Symposium (IRC/IAMAS)". 2017. pp. 040008.
58. Smokty O.I. Numerical simulation of the brightness coefficients of a flat homogeneous layer on the basis of the mirror image principle and solutions of linear singular integral equations. Proceedings of SPIIRAN. 2017. No. 2 (51). pp. 177–205.
59. Smokty O.I. Unified exit function for upgoing and downgoing radiation at arbitrary symmetrical levels of uniform slab. В сборнике: AIP Conference Proceedings Radiation Processes in the Atmosphere and Ocean. Сер. "Radiation Processes in the Atmosphere and Ocean, IRS 2016: Proceedings of the International Radiation Symposium (IRC/IAMAS)" 2017. pp. 040009.

Laboratory of Information Technologies in Transport

Head of Laboratory: Dr. Tech.Sci., Professor. Yury M. Iskanderov - automation and informatization of large complex dynamic systems, system analysis and integration of information resources, formalization of decision-making processes, knowledge engineering, intelligent transport systems, iskanderov_y_m@mail.ru

Laboratory Staff – 7 researchers.

Research Activities

Integration of information resources of transport systems. Global information transport systems. Intelligent support for transport management processes.

System analysis and structuring of information resources of transport systems. Informatization and automation of transport systems of regions and urban agglomerations.

Information and computer security of transport systems. Specialized information retrieval systems.

Informatization and automation of transport infrastructure. Information processing systems in transport systems. Intelligent data analysis.

Systems for collecting, receiving and presenting spatial data on the state and functioning of transport systems, including using geoinformation technologies.

Research Fellows

Leading researcher Dr. Tech. Sci., Associate.Professor Vladimir V. Barabanov – system analysis, intelligent decision support systems, automation of dynamic system management, methods for optimizing network structures, vlbar@yandex.ru

Leading researcher Dr.Tech.Sci, Professor Yan A. Ivakin – methods and models for the collection and presentation of spatial data on the state and functioning of transport systems, the intellectualization of geoinformation systems, the qualification of software and information systems, the automation of substantive humanitarian research, ivakin@oogis.ru

Leading researcher Dr.Tech. Sci., Associate Professor Ilya S. Lebedev – methods and models of information and computer security of transport systems, methods of monitoring information security, isl_box@mail.ru

Senior researcher Cand. Tech. Sci., Associate Professor Michael B. Laskin – methods and models of information processing in transport systems, data mining, methods of strategic planning of the development of transport and logistics infrastructure, laskinmb@yahoo.com

Senior researcher Cand. Tech. Sci. Sergey N. Potapychev – intellectual geoinformation systems, modern methods of visualization of complex spatial objects in three-dimensional form, modeling of transport-logistical processes with the use of geoinformation systems, potapychev@oogis.ru

Defense of Thesis

Alisa A.Vorobiova, “Method of identification of the Internet user on the basis of stylistic and linguistic characteristics of short electronic messages”, Cand. Tech. Sci. on speciality 05.13.19, supervised by Associate Professor Ilya S. Lebedev.

Master Students

Bachelor and Master students at the Basic SPIIRAS Department at the St. Petersburg School of Economics and Management NRU HSE «IT in Logistics»: 5 (theses supervisors – Yury Iskanderov, Michael Laskin)

Bachelor and Master degrees students at the Faculty of Information Technology Security of ITMO University: 16 (supervised by Associate Professor Ilya S. Lebedev)

Post-graduate Students

Seven post-graduate students at the Faculty of Information Technology Security of ITMO University: supervised by Associate Professor Ilya S. Lebedev

Grants and Projects

Yan A. Ivakin – RFBR project No. 16-07-00127-A «Intellectual support for decision-making in the geospatial reconstruction of the dynamics of historical and geographical processes», 2016-2018.

University Courses

National Research University "Higher School of Economics" (SPb): Information support of logistics business processes in supply chains – Y.M. Iskanderov, I.S. Lebedev); Research seminar (Y.M. Iskanderov, I.S. Lebedev); Vocational orientation workshop (Y.M. Iskanderov, I.S. Lebedev); Scientific practical seminar "Strategic Planning of Logistics Infrastructure Development" (M.B.Laskin, V.V. Barabanov); Vocational lectures "Supertrends of the world economy: promising sectors for the next 20-30 years in the macroeconomic aspect" (M.B. Laskin);

ITMO University: «Technologies and methods of programming», «Expert systems for the integrated assessment of the security of information and telecommunications systems», «Hardware and software for information security», « Programming information security tools», « Information security of computer systems», «Designing of information-analytical security systems » (I.S. Lebedev);

State University of Aerospace Instrumentation (SPb): Information technologies in quality management, information protection (Y.A. Ivakin).

Conferences, exhibitions

VII International Forum "Transport Security", April 6-7, 2017, St. Petersburg, Russia – Yu. Iskanderov.

Forum "Business for Equal Opportunities. Transport infrastructure", Round table" Intellectual transport systems as an element of transport infrastructure ", April 25-27, 2017, St. Petersburg, Russia – Yu. Iskanderov, M. Laskin.

8th International Symposium "Information Integration and Intelligent Geoinformation Systems", May 10-12, 2017, Shanghai, Maritime University – Ya. Ivakin, S. Potapychev.

5th International Scientific Conference "Magneto-Levitic Transport Systems and Technologies", May 24-26, 2017, St. Petersburg, Russia – Yu. Iskanderov, V. Barabanov, I. Lebedev.

X International Conference "TRILOGY" (Transport, Investments, Logistics), May 30, 2017, St. Petersburg, Russia – Yu. Iskanderov, M. Laskin.

4th International Scientific and Practical Conference "Simulation and Complex Modeling of Marine Equipment and Marine Transport Systems", June 28, 2017, St. Petersburg, Russia – Yu. Iskanderov, V. Barabanov, M. Laskin, I. Lebedev.

11th International Conference "Application of Information and Communication Technologies" (AICT2017), September 20-22, 2017, Moscow, Russia – Yu. Iskanderov, I. Lebedev.

International Conference "Applied Mathematics and Computer Science", 2017, Rome, Italy – M. Laskin.

European Conference of Electrical and Computer Sciences, 2017, Bern, Switzerland, – M. Laskin.

The Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Applications to Science and Industry "Imitation Modeling. Theory and Practice "(IMMOD-2017), October 18-20, 2017. St. Petersburg, Russia – Yu. Iskanderov, M. Laskin, I. Lebedev.

Jubilee X St. Petersburg Interregional Conference "Information Security of Russian Regions (ISRR-2017)", 1-3 November 2017, St. Petersburg, Russia – Yu. Iskanderov, I. Lebedev, V. Barabanov.

Research Management

Yury Iskanderov – member of the organizational and program committees, co-chair of the section "Information Security in Transport"

of the International Conference "Information Security of Russian Regions (ISRR-2017)".

Ilya Lebedev – member of the Program Committee of the International Conference. 20th FRUCT-ISPIT Conference and Information Security and Protection of Information Technologies Seminar, St.Petersburg Petersburg (SCOPUS); Member of the Program Committee, Scientific Secretary of the Section "Information Security in Transport", International Conference "Information Security of Russian Regions (ISRR-2017)".

International Cooperation

Cyprus University of Technology (Cyprus, Limassol) - an agreement on scientific and technical cooperation and exchange of young researchers has been signed.

Membership in Domestic and International Societies, Editorial Boards, etc.

Yury Iskanderov – chairman of the Board of the main educational programs of the baccalaureate "Business Informatics" and the Master's Degree "Information Business Analytics" of the St. Petersburg State University; Head of the basic department "Information Technologies in Logistics" SPIIRAS in the Higher School of Economics (St. Petersburg); member of the editorial board of the scientific journal "Bulletin of the Admiral Makarov State University of Maritime and Inland Shipping "; full member of the Russian Transport Academy.

Ilya Lebedev – expert of competitive projects of the FTP "Research and development in priority areas of development of the scientific and technological complex of Russia for 2014-2020"; Head of the main professional educational program of higher education - Master's program "Information security" of the ITMO University

Michael Laskin – member of the Scientific and Methodological Council of the Self-Regulating Organization of Appraisers "Community of Assessment Professionals", St. Petersburg, Russia

Yan Ivakin – member of the editorial board of the journal «Vestnik of the St. Petersburg University of Technology and Design. Natural and technical sciences.

Recent Results

1. A model of a multi-agent system for the formation and organization of the functioning of transport-technological processes (TTP) is proposed, which implements the strategies of utility theory with minimal concessions and the theory of social dependencies. The implementation of this model allows solving the main tasks related to the management of transport logistics processes,

i.e. dynamically rearrange the information system that ensures the functioning of the TTP; encapsulate previously developed tools and programs into an integrated information system; unify the software of enterprises involved in the implementation of the TTP; Ensure entry into the international information space for the development of electronic and mobile services [4, 5, 8-13].

2. An approach to the classification of the state of information security of transport systems based on the use of electromagnetic radiation of functioning electronic components is proposed. This approach allows, based on the consideration of a wireless network subject to a "broadcast storm" attack, to determine its ability to perform functional tasks, to determine the conditions for organizing attacks from a potential violator. As a result, a model for determining the technical characteristics of devices for a secure wireless self-organizing network [1-3, 14].

3. An approach to the implementation of geoinformation support for solutions for managing spatial processes in the context of environmental variability is proposed. This approach allows us to determine the characteristics of the indicators of the current situation for the information support of the person making the decision. The structure of the software and the structure of information links of the relevant indicators are proposed, proposals are formulated aimed at creating applied decision support systems [7, 16, 21].

4. A geochronological tracking method was developed as a methodological tool for integrating spatially coordinated, heterogeneous information on the basis of GIS. This approach allows us to discover new possibilities for the application of approved analytical methods, in particular, the application of the method of determining a subgraph isomorphic to a given one, applied to the geochronological tracking graph, to allow us to trace the patterns in the features of the subject domain under study for the corresponding historical period [6, 15, 17-20].

References

Papers published in journals and editions indexed by WoS, Scopus

1. Sukhoparov V., Lebedev I., Krivcova I. The use of amplitude-frequency characteristics spurious emissions to analyze the state of information security. Automatic Control and Computer Sciences. – 2017 г.
2. Lebedev I., Bazhayev N., Sukhoparov M., Krivtsova I., Pecherkin S., Kolcherin D., Iskanderov Yu., Davydov A., Shaparenko Yu. Determining the status of the device based on the radiation chi-squared test (χ2 test)// 11th International

Conference on Application of Information and Communication Technologies (AICT). 2017.
3. Salachutdinova K., Lebedev I., Krivtsova I., Bazhayev N., Sukhoparov M., Smirnov P.I, Markelov D., Davydov A., Pecherkin S., Kolcherin D., Shaparenko Yu., Iskanderov Yu., Bazhayev N. A Frequency Approach to Creation of Executable File Signatures for their Identification// 11th International Conference on Application of Information and Communication Technologies (AICT). 2017
4. Rusakov O., Laskin M. “A stochastic model for stationary dynamics of prices in real estate markets. A case of random intensity for Poisson moments of prices changes», AIP Conference Proceedings 1836, 020087 (2017);
5. Rusakov O., Laskin M. «Self-Similarity in the Wide Sense for Information Flows With a Random Load Free on Distribution», in EECS 2017 (European Conference on Electrical Engineering and Computer Science) proceedings) , Bern, Switzerland, 2017.
6. Ivakin Ya., Potapychev S.. Geochronological tracking - a specialized GIS tool for scientific research - Proceedings of the 8th International Symposium "Information Integration and Geoinformation Systems" 2017 (IF & GIS 2017), China, Shanghai - Springer Verlag, 2017.
7. Potapychev S., Ermolaev V. Geoinformation support of the distribution of search efforts in conditions of environmental variability. - Proceedings of the 8th International Symposium "Information Integration and Geoinformation Systems" 2017 (IF & GIS 2017), China, Shanghai - Springer Verlag, 2017.

Papers published in Russian journals and editions indexed by RCSI

8. Iskanderov Yu., Laskin M., Lebedev I. Features of modeling of transport-technological processes in supply chains. Collection of Proceedings of the Eighth All-Russian Scientific and Practical Conference on Simulation Modeling and its Applications in Science and Industry "Imitation Modeling. Theory and practice" (IMMOD-2017). (St. Petersburg, October 18-20, 2017). St. Petersburg: Publishing House of the VVM, 2017. pp. 110-113.
9. Iskanderov Yu., Ershov A. Formation of a safe knowledge base for an intelligent system for designing automated control systems in transport. Collection of articles X of the St. Petersburg Interregional Conference "Information Security of the Regions of Russia (ISRR-2017). SPb., 1-3 November 2017. SPOISU. SPb., 2017.

10. Iskanderov Yu., Chumak A. Providing information security for the transportation of oversized cargo. Collection of articles X of the St. Petersburg Interregional Conference "Information Security of the Regions of Russia (ISRR-2017). SPb., 1-3 November 2017. SPOISU. - SPb., 2017.
11. Iskanderov Yu., Pautov M. Protection of corporate information in transport and logistics networks. Collection of articles X of the St. Petersburg Interregional Conference "Information Security of the Regions of Russia (ISRR-2017). SPb., 1-3 November 2017. SPOISU. - SPb., 2017.
12. Laskin M. Correction of market value for the pricing factor "area of the object." Property relations in the Russian Federation, No. 8, 2017, pp.86-99.
13. Laskin M. Statistical analysis of the results of trades. Interval of the starting price. Property relations in the Russian Federation, No. 12, 2017.
14. Sukhoparov M., Lebedev I., Krivtsova I. Use of amplitude-frequency characteristics of spurious emissions for analyzing the state of information security. Problems of Information Security. Computer systems. 2017.
15. Ivakin, Ya. Smirnova O., Potapychev S. Application of GIS-tools for geochronological tracking for network analysis of biographical data.. Information and space. 2017. No. 1, pp. 132-138.
16. Potapychev S., Ermolaev V., Karishnev N., Popovich V. Indicators of tactical situation for operators of hydroacoustic means.. Marine radio electronics. 2017, № 3, pp. 28-33.
17. Ivakin Ya., Potapychev S. Development of information technology geochronological tracking for historical research in GIS.. Historical informatics. 2017, № 2, pp. 45-55.
18. Ivakin Ya., Michurin S., Semenova E. Data modeling for intelligent geoinformation systems. Journal "Radioelectronics questions", №5 -2017, pp. 32-35.
19. Ivakin Ya., Oparin A. Requirements for GIS for the management of mobile robotic technological complexes - Journal of Radioelectronics Questions, No. 5, 2017, pp.91-101.
20. Ivakin Ya., Podkolzin A. Realization of information technology of geochronological tracking on the basis of object-oriented GIS - Journal "Information Technologies and Telecommunications", Volume 5, №2 - June 2017, pp. 45-55.
21. Ivakin Ya., Semenova E., Smirnova M. Modeling of continuous action for impulse links of controllable dynamic systems. Modeling and situational management of quality of complex systems: Collected papers - SPb.,: SUAI, 2017.pp. 106-110.

R&D Department of Information Security Problems

Head of the Department: Dr. Tech. Sci., Professor Alexander A. Moldovyan – investigation and development of the algorithms and means for information protection. maa1305@yandex.ru

Department Staff – 7 members.

The department includes 2 scientific-research laboratories: cryptology laboratory and information systems security laboratory.

Head of the Cryptology Laboratory: Dr. Tech. Sci., Professor, Honored Inventor of the Russian Federation Nikolay A. Moldovyan – synthesis and analysis of the cryptographic primitives for designing block ciphers, schemes and protocols for authentication of the electronic documents and messages, for public encryption, and for public key distribution. nmold@mail.ru

Head of the Information Systems Security Laboratory: Cand. Tech. Sci. Roman Sh. Fakhrutdinov – investigation and design of the algorithms and means for information protection, certificate testing, computer-technical expertise.

Research Fellows

Senior researcher Cand. Tech. Sci. Anatoliy Yu. Mirin – investigation and design of the algorithms and means for information protection, certificate testing, computer- technical expertise.

Researcher Cand. Tech. Sci. Dmitriy M. Latyshev – investigation and design of the algorithms and means for information protection.

Researcher Anna A. Popova – investigation and design of the algorithms and means for information protection, certificate testing, computer- technical expertise.

Researcher Anna A. Kostina – investigation and design of the algorithms and means for information protection, certificate testing, computer- technical expertise.

Leading engineer– TatianaV. Berezina – infractructure of the work stations, office work.

University Courses

SPbSEEU: Cryptographic protocols (Moldovyan, N.A.)

Protection of the operational systems and data bases. (Moldovyan A.A.)

Admiral Makarov State University of Maritime and Inland Shipping: Cryptographic methods for information protection. Foundations of Cryptography. (Moldovyan N.A.)

Complex information security of the management systems (Moldovyan A.A.)

A. F. Mozhaysky Military - Space Academy: Mathematic basis of Cryptography (Moldovyan N.A.)

Conferences

International conference “The 20th FRUCT’20 Conference”, April 3-7, 2017, St. Petersburg, Russia – Moldovyan A.A., Moldovyan N.A.

International conference “The Fourth Conference of Mathematical Society of the Republic of Moldova dedicated to the centenary of Vladimir Andrunachievici (1917-1997)”, June 28 - July 2, 2017, Chisinau. Moldova – Moldovyan A.A., Moldovyan N.A.).

International conference “The 3rd EAI International Conference on Industrial Networks and Intelligent Systems”. September 4, 2017, Ho Chi Minh City, Vietnam – Moldovyan A.A.

International Cooperation

Le Qui Don Technical University, Hanoi, Vietnam.

Institute of Mathematics and Computer Science of the Academy of Sciences of Moldova: finite algebraic structures as primitives of the cryptographic algorithms and protocols.

Recent Results

1. Methods for secure encryption with using small-size shared keys [1, 6].
2. Methods for pseudo-probabilistic no-key encryption based on commutative encryption functions [1,6,7].
3. New protocols of collective digital signature for signing groups and individual signers [4, 8].
4. Protocols of collective digital signature of the combined type in which the single signature is formed for arbitrary number of group signers and individual signers [6].
5. Method for block encryption in the error correction mode [3].
6. Method for pseudo-probabilistic public-key encryption [2].
7. Hybrid protocol for deniable encryption [5].

References

Papers Published in Editions Indexed by WoS, Scopus

1. Moldovyan N.A., Shcherbacov A.V., Eremeev M.A. Deniable-encryption protocols based on commutative ciphers. Quasigroups and related systems. 2017. Vol. 25. no. 1, pp. 95-108.
2. Moldovyan N.A. Berezin A.N., Kornienko A.A., Moldovyan A.A., Deniable Encryption Protocols Based on Probabilistic Public-

Key Encryption. Proceedings of the 20th FRUCT'20 Conference, 3-7 April 2017, Saint-Petersburg Electrotechnical University "LETI" and Technopark of ITMO University, Saint-Petersburg, Russia. FRUCT Oy, Finland ISSN 2305-7254, ISBN 978-952-68653-0-0, 776p. (Editors: Sergey Balandin, Alla Levina and Tatiana Tyutina) pp. 275-283.

3. Moldovyan N., Levina A., Taranov S. Symmetric Encrytion for Error Correction. Proceedings of the 20th FRUCT'20 Conference, 3-7 April 2017, Saint-Petersburg Electrotechnical University "LETI" and Technopark of ITMO University, Saint-Petersburg, Russia. FRUCT Oy, Finland ISSN 2305-7254, ISBN 978-952-68653-0-0, 776p. **(**Editors: Sergey Balandin, Alla Levina and Tatiana Tyutina**).** pp. 290-295.
4. Minh Hieu, Hai Nam, Moldovyan N.A., Giang Tien. New Blind Signature Protocols Based on a New Hard Problem. The International Arab Journal of Information Technology, Vol. 14, No. 3, May 2017 p. 307—313.

Papers Published in Russian Editions Indexed by RSCI

5. Mikhteev M.S., Moldovyan N.A. Hybrid protocol for deniable encryption based on authentication procedure. Questions of information security. 2017. № 1. С. 12-17.
6. Goryachev A.A., A.A., Latyshev D.M., Moldovyan A.A. Method for fast commutative encryption. Questions of information security. 2017. № 1. С. 3-11.
7. Abrosimov I.K,, Kovalyova I.V., Moldovyan N.A. Post-quantum no key protocol. Questions of information security. 2017. № 3. pp. 3-13
8. Morozova E.V., Moldovyan N.A., Shapovalov P.I. New types of digital signature protocols. Questions of information security. 2017. № 2. С. 37-43.

Other Publications

9. Moldovyan A.A., Moldovyan N.A., Shcherbacov V.A. Non-commutative finite rings with several mutually associative multiplication operations, The Fourth Conference of Mathematical Society of the Republic of Moldova dedicated to the centenary of Vladimir Andrunachievici (1917-1997), June 28 - July 2, 2017, Chisinau, Proceedings CMSM4, 2017, p. 133-13.

Department of Post-Graduate Studies, Information and Educational Technologies and Services

Head of Department: Senior researcher, Cand. Tech. Sci., Associate Professor Vladimir I. Salukhov- information technology in education, managing the life cycle of info-telecommunications systems, analysis and development of support systems and decision-making based on modern information technologies, methodology of system of distributed situational centers and centers of competence; visal@iias.spb.su.

The staff consists – 19 members.

Field of study Department

Information technology in education and the development of a United training center the satellite data processing Earth remote sensing, and computer scientific and educational center of SPIIRAS. Analysis of free software and its use in scientific and educational centers. Modelling and automation of control systems situation. Application of methods of multi-criteria statistical analysis and to build distributed expert systems, including medical facilities.

Research Fellows

Dr. Tech. Sci., Professor Andrey N. Mironov– development and research of methodological and methodical bases of solving problems of structural-functional synthesis of intellectual information technologies and systems of condition monitoring of complex technical objects operating in real time in a rapidly changing environment mironov-anik@yandex.ru.

Dr. Tech. Sci., Professor – Oleg I. Kutuzov – the development and study of methods of accelerated modeling, kutuzov-oleg@mail.ru.

Dr. Tech. Sci., Professor Pavel I. Paderno– development of methods of aggregation and aggregation of expert evaluations, pipaderno@list.ru.

Cand. Psych. Sci., Associate Professor Nina V. Belomestnova – fundamental problems of psychology, philosophy and methodology of psychology, the fundamental processes of cultural Genesis and psychological mechanisms of cultural Genesis, theory and practice of clinical psychology, theory and practice of judicial psychological examination, belomestnovanina@bk.ru.

Dr. Phil. Sci., Professor Plebanek Olga Vladimirovna – the philosophy of science, postnonclassical cognitive practice philosophy of culture, civilization studies, nonlinear processes in social dynamics, plebanek@mail.ru.

Cand. Phil. Sci., Associate Professor Natalia A. Alexandrova – study of modern trends in pedagogics and psychology in different social environments, natali-aleksandrova@yandex.ru.

Senior researcher Cand. Tech. Sci., Associate Professor Viktor V. Kasatkin – information technology in education; information systems and technology, v.v.kasatkin@mail.ru.

Researcher Cand. Tech. Sci. Anna I. Motienko– development of information and communication systems, telemedicine; telemedicine network, medical application, Bayesian belief networks, and systems engineering decision support, robotics, rescue robots, human-computer interaction, transportation of injured, first aid, rescue work, emergency situation, anna.gunchenko@gmail.com.

University Courses

SpBGMU: Informatics (Motienko A. I.)

SPIIRAS Pedagogy of Higher Education (Shatilova I.I.)

Sciences History and Philosophy (Plebanek O.V.)

A. F. Mozhayskiy Military Space Academy: Reliability and Tests of Aircraft (Mironov A.N.)

BSTU «VOENMECH»: Psychology and Sociology of Work (Belomestnova N.V.)

Conferences

The 70th Scientific Conference of the Faculty ETU "LETI", 01-11 February 2017, St. Petersburg, Russia – Kutuzov O.I., Paderno P.I.

XXIII International Scientific-Methodical Conference "Modern education: contents, technologies, quality", 21 April 2017, Saint-Petersburg, Russia – Paderno P.I., Kasatkin V.V.

V International Congress "Global studies: global environment and sustainable development", 25-30 September 2017, Moscow, Russia – Plebanek O.V.

Anniversary X St.-Petersburg Interregional Conference Information Security of Russian Regions (ISRR–2017), 1-3 November 2017, St. Petersburg, Russia – Kasatkin V.V., Plebanek O.V.

28th International Scientific-Technical Conference "Extreme robotics (ER-2017)", 2-3 November 2017, St. Petersburg, Russia – Motienko A.I.

III Interregional Scientific-Practical Conference «Perspective directions of development of domestic information technologies», 2017, Sevastopol: SevSU – Kasatkin V.V., Salukhov V.I.

XVII Frolovskaya reading: the 90th anniversary of Hermann Haken. The 100th anniversary of Ilya Prigogine. The human world: uncertainty as a challenge. 21 November 2017, Moscow, Russia – Plebanek O. V.

Membership in Domestic and international Societies, Editorial Boards, etc.

Salukhov V.I. – member of the editorial Board of the Journal the WORLD of TELECOM

Recent Results

1. Methodology of optimization of structure of the robotic means of salvation affected based on the alternative graph formalization of the relationships between different variants of construction elements of the robotic tools and the functions to be performed and to shorten the time of detection of injuries in the affected by minimizing the number of functions performed by determination of the signs of trauma [1].
2. Technique of selecting the way of rescue of the affected in the accident at the hazardous production facilities, that describes the recovery process of the affected with the use of robotic tools rescue and transportation and allows to choose a rational sequence of necessary actions that increase the number of found and rescued the affected [1].
3. Conceptual model of the infocommunication systems of monitoring of the health status of the population. The system is designed to gather preliminary data on the health status of the population, preliminary diagnosis, recommendations to the patient and the optimization of health care institutions and ambulance crews [3].
4. Theoretically substantiated and experimentally tested method to decrease the dispersion of the positioning of robotic complexes on the basis of the combined use of RFID technologies or ZIG-BEE to eliminate possible erroneous actions of the robot generated by the inaccuracy of the model in the external environment in which the learning of a robot [10].

References

Monographs

1. Plebanek O.V. Global geopolitics. Call: monograph. Edited by I.I. Abylgaziev, I.V. Ilyin, I.F. Kefeli. M.: Publishing house of Moscow University. 2017. 280 p. 32 Il. pp. 106–141.
2. Information-psychological and cognitive safety. The collective monograph. Edited by I.F. kefeli), R.M. Yusupov. ID "Petropolis", St. Petersburg. 2017. 300 p.
3. Dorokhov A.N., Kernozhitskiy V.A., Mironov A.N., Shestopalova O.L. The reliability of complex technical systems: textbook, 3rd ed., erased. SPb.: Publishing House "LAN". 2017. 352 p.

Papers published in Russian journals indexed in RSCI

4. Motienko A.I., Basov O.O., Bizin M.M. System of support of decision-making about salvation affected as a result of accidents on hazardous industrial facilities. Scientific Herald of the Novosibirsk state technical University. 2017. vol. 2 (67). pp. 65-82. (The higher attestation Commission, Russian science citation index, impact factor – 0,223).
5. Motienko A.I., Ronzhin A.L., Altunin A.A., Kryuchkov B.I., Usov V.M. Evacuation of an astronaut in a spacesuit during extravehicular activity on the lunar surface involving rescue robots.

mechatronics, automation, control. 2017. Issue 18. vol. 11. pp. 734-739. (The higher attestation Commission, Russian science citation index, impact factor: 0,433).
6. Motienko A. I. Background of the establishment of information and communication systems monitoring the health status of the population. Scientific results. Information technology. 2017. vol. 3(7). pp. 24-30. (RISC).
7. Gryaznov N.A. Senchik K.Y., Motienko A.I., Ronzhin A.L., Kosachev V.E., Usov V.M. The Use of robotic systems in the provision of the first (pre-medical) aid to victims of emergency situations. The message 1. Emergency Medicine. 2017. vol. 4. pp. 15-19 (higher attestation Commission, Russian science citation index, impact factor – 0,218).
8. Salukhov V.I., Sokolov B.V. The Educational component in the formation and establishment of the system of distributed situational centers and competence centers. international scientific-analytical journal of Strategic priorities. 2017. vol. 2(14). pp. 138–148 (Russian science citation index, impact factor – 0,973).
9. Gorodetsky I.G., Nazarenko N.A. Paderno P.I. Training and retraining of ergonomists. Human factors: problems of psychology and ergonomics. 2017. vol. 3 (83). pp. 18-23 (SCI, impact factor 0,287).
10. Andreevskiy E.V., Paderno P.I. The Methodology of ergonomic analysis of internal threats in the system of physical protection of potentially dangerous objects. Human factors: problems of psychology and ergonomics. 2017. vol. 3 (83). pp. 32-36 (RSCI, impact-factor 0,287).
11. Kutuzov O.I., Tatarnikova T.M. The analysis of the paradigms of simulation modeling. Scientific and technical journal of information technologies, mechanics and optics. 2017. T. 17. No. 3. P. 552-558. (The higher attestation Commission, RSCI, impact factor: 0.305).
12. Burkov E.A., Paderno P.I. Model checking the knowledge of students in conducting online test. Educational technologies and society (Educational Technology & Society). 2017. vol. 20(1). pp. 424-432 (SCI, impact factor – 0,984).
13. Kondratyev V.V., Salukhov V.I., Sokolov B.V. The Combined use of RFID technologies or ZIG-BEE for condition monitoring of robotic systems. the XVI Russian conference "Distributed information and computational resources. Science – the digital economy" (DICR'2017): Novosibirsk. 2017. Novosibirsk: IVT so ran. S. 17.
14. Mironov A.N., Lissitzky V.V., Kazakov R.R., Kharchenko I. N. The method of justification of requirements to the system of launch vehicles, spacecraft, military and dual-use. Bulletin of Scientific-technical Council Military-the industrial Commission of the Russian Federation. 2017. vol. 3(12). pp. 36-48.

15. Sokolov B.V., Salukhov V.I. Methodological aspects of formation of system of distributed situational centers. Information security of Russian regions (ISRR-2017). Anniversary X St. Petersburg interregional conference. 2017. pp. 26-27.
16. Salukhov V.I., Soldatenko V.S. Determining the factors of distortion of the information process on the basis of Mamdani algorithm// Information security of Russian regions (ISRR-2017). Anniversary X St. Petersburg interregional conference. SPOIS. SPb. 2017. pp. 72-73.
17. Kasatkin V.V., Yakovlev S.A. the Updating of the engineering components of the masters in the direction "Information systems and technology". Modern education: contents, technologies, quality: XXIII Intern. scientific-method. Conf.: Publishing house ETU "LETI". 2017. Vol. 2. pp. 225-227.
18. Sovetov B.Ya., Kasatkin V.V. Import Substitution as a way of ensuring technological security of Russia. Information security of Russian regions (ISRR-2017). Anniversary X St. Petersburg interregional conference. SPOIS. SPb., 2017. pp. 26-27.
19. Sovetov B.Ya., Kasatkin V.V. Modernization of the multilevel system of higher education in Russia in the conditions of modern internal and external threats to Information security of regions of Russia (ISRR-2017). Anniversary X St. Petersburg interregional conference. SPOIS. SPb., 2017. pp. 486-487.
20. Sovetov B. Ya., Kasatkin V. V. Ensuring personnel safety of industrial enterprises of high-tech industries. Regional science and information security. The collection of works. SPOIS. SPb. 2017. Vol. 3. pp. 17–19.
21. Versun N.A., Kolbanev M.O., Kasatkin V.V. a network-centric paradigm of management in a digital society. Regional Informatics and information security. The collection of works. SPOIS. SPb. 2017. Vol. 3. pp. 188–193.
22. Versun N.A. Kasatkin V.V., Kolbanev M.O. Digital technology, info-communications and business Information technology digital economy: Collection of articles. SPb.: Publishing house FINEC, 2017. pp. 29–34.
23. Kasatkin V.V., Salukhov V.I., Yusupov R.M. Methodological and methodical bases of creation of regional competence centers. System of distributed situational centers as the basis for the digital transformation of public administration. All-Russian forum. SPb.: Publishing house of St. Petersburg state University. 2017.
24. Yusupov R.M., Sokolov B.V., Salukhov V.I. Information-methodical maintenance of functioning of system of distributed situational centers and centers of excellence. Perspective direc-

tions of development of domestic information technologies: materials of III interregional scientific-practical conference. Sevastopol: SevSU, 2017. pp. 14-18.
25. Kasatkin V. V., Yakovlev S. A. Artificial intelligence and simulation experiments with models of information systems. Perspective directions of development of domestic information technology. Materials of the round tables: proceedings of III interregional scientific-practical conference. Sevastopol: "RIBET". 2017. pp. 12-15.
26. Yusupov R.M., Kasatkin V.V., Sokolov B.V., Okhtilev M.Y. Analysis of the impact of information technology on the effectiveness of control systems for complex objects. Perspective directions of development of domestic information technologies: materials of III interregional scientific-practical conference. Sevastopol: SevGU. 2017. pp. 14-18.
27. Versun N.A., Kolbanev M.O., Kasatkin V.V. Information and communication environment that implements a network-centric approach to management. Perspective directions of development of domestic information technologies: materials of III interregional scientific-practical conference. Sevastopol: SevGU.2017. pp. 76-78.

Other Publications

28. Motienko A.I., Ronzhin A.L., Altunin A.A., Kryuchkov B.I., Usov V.M. Evacuation of an astronaut in a spacesuit during extravehicular activity on the lunar surface involving rescue robots. abstracts of International scientific-technical conference "Extreme robotics". 2017. pp. 170-171.
29. Kotova E.E., Paderno P. I. The study of the productivity of training of students in the regulation of cognitive load. proceedings of the XXIII International scientific-methodical conference "Modern education: contents, technologies, quality". SPb.: Publishing house ETU "LETI". 2017. pp. 126-127.
30. Kolpakov A.S., nichiporovich M.O., Paderno P.I., Ugryumov V.V. Student supervision is a positive experience and problems. proceedings of the XXIII International scientific-methodical conference "Modern education: contents, technologies, quality". SPb.: Publishing house ETU "LETI". 2017. pp. 295-297.
31. Burkov E.A., Lubkin I.P., Paderno P.I. Teacher through the eyes of students: obtaining a current profile. proceedings of the XXIII International scientific-methodical conference "Modern education: contents, technologies, quality". SPb.: Publishing house ETU "LETI". 2017.
32. Burkov E.A., Lubkin I.P., Paderno P.I. Profile of the teacher in the eyes of students – the key to feedback. proceedings of the XXIII International scientific-methodical conference "Modern education: contents, technologies, quality". SPb.: Publishing house ETU "LETI". 2017.

33. Kutuzov O.I. Formalisms of mathematical modeling of information networks and their elements. Scientific conference of the faculty ETU "LETI". SPb. 2017.
34. Kazakov R.R., Mironov A.N., Sizyakov N.P., Harchenko I.N. Method of justification of variants of modernization of units and systems of space-rocket complexes with regard to achieved reliability and operating costs. proceedings of the A. F. Mozhayskiy Military Space Academy. Justification the requirements for the advanced samples of arms and military equipment. 2017. Vol. 1(658). pp. 145-150.
35. Bastin E.V., Kazakov R.R., Mironov A.N., Harchenko I.N. Analysis of the current state and prospects of development of system of means of launching foreign satellites for military and dual-use. proceedings of the A. F. Mozhayskiy Military Space Academy. Justification the requirements for the advanced samples of arms and military equipment. 2017. Vol. 1(658). pp. 135-144.
36. Kazakov R.R., Mironov A.N., Platonov S.A., Kazakov N.P. Harchenko I.N. Predicting the remaining life of space vehicles of military and dual-purpose, taking into account possible destructive radiation effects on the elements of power supply system/ / proceedings of the A. F. Mozhayskiy Military Space Academy. Justification the requirements for the advanced samples of arms and military equipment. 2017. Vol. 1(658). pp. 246-255.
37. Mironov A.N., Lissitzky V.V., Kazakov R.R., Harchenko I.N. Scientific and methodological support of the system requirements launch vehicle spacecraft for military and dual-use. Proceedings of the A. F. Mozhayskiy Military Space Academy. 2017. Vol. 6(663). pp. 333-351.
38. Belomestnova N.V. Admakina T. A. Analysis of the signs of negativity in the drawings of children in the practice of psychopedagogical expertise (experimental validation). Materials of VI International scientific-practical conference "Theory and practice of forensic examination in modern conditions". M. 2017. pp. 16–21.
39. Belomestnova N. In. Possibility of application of MMPI psychological techniques in the practice of forensic psychological expertise in criminal process. Materials of VI International scientific-practical conference "Theory and practice of forensic examination in modern conditions". M. 2017. pp. 45–48.
40. Belomestnova N.V. Experience of using methods of The Hand test in the practice of forensic psychological expertise in criminal process. Theory and practice of forensic expertise: international experience, problems, prospects: collection of scientific works of the I International forum. M.: Moscow University of the MIA of Russia named after V. J. Kikot. 2017. pp. 415-420.

Abbreviations

BSTU	Baltic State Technical University
DNTIT RAS	Departament of Nano Technologies and Information Technologies
FAR	Foundation for Advanced Research
FASO Russia	Federal Agency for Scientific Organizations
FRP	Fundamental Research Program
FTP	Federal Target Program
MAPE	Medical Academy of Postgraduate Education
NMRU	National Mineral Resources University
PFSPSMU	Pavlov First St. Petersburg State Medical University
PSTU	Petersburg State Transport University
RSPU	Russian State Pedagogical University
SPIIRAS	St.Petersburg Institute for Informatics and Automation….
SPSAEE	St.Petersburg State Academy of Engineering and Economy
SPSEEU	St.Petersburg State Electrical Engineering University
SPSMTU	St. Petersburg State Marine Technical University
SPSPTU	St.Petersburg State Polytechnical University
SPSRCRAS	St.Petersburg Scientific Research Center of the Russian Academy of Science
SPSU	St.Petersburg State University
SPSUACE	St.Petersburg State University of Architecture and Civil Engineering
SPSUAI	St.Petersburg State University of Aerospace Instrumentation
SPSUITMO	St.Petersburg State University of Information Technologies, Mechanics and Optics
SPSWU	St.Petersburg Water Communications University

The report materials are printed as submitted by the heads of research units.
General information and text editing Ronzhin A.L., Silla E.P.
English proofreading Podnozova I.P.
Computer composition Motienko A.I., Belova R.I.

CONTENTS