Russian Federation

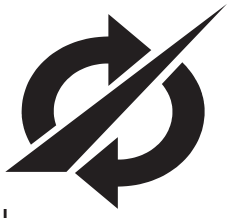
Federal Agency for Scientific Organizations

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

Annual Report
2016

St. Petersburg, 2016

SPIIRAS



Russian Federation

Federal Agency for Scientific Organizations

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

Annual Report 2016

St. Petersburg, 2016

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, Doctor of Technical Sciences, PhD
Tel: +7(812)328-7081, E-mail: **ronzhin@iias.spb.su**

Deputy-Director for Research
Sokolov, Boris V.
Professor, Doctor of Technical Sciences, PhD
Honored Scientist of the Russian Federation
Tel: +7(812)328-0103, E-mail: **sokol@iias.spb.su**

Deputy-Director for Information Security
Moldovyan, Alexander A.
Professor, Doctor of Technical Sciences, PhD
Tel: +7(812)328-51-85, E-mail: **maa1305@yandex.ru**

Deputy-Director for Maintenance
Tkach, Anatoly F. Associate Professor, PhD
Tel: +7(812)328-1433, E-mail: **spiiran@iias.spb.su**

Scientific Secretary
Silla, Evgeny P. PhD
Tel: +7(812)328-0625; E-mail: **silla@oogis.ru**

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.

Applied results of the Institute's research are oriented to developing the technologies specified by The List of Crucial Technologies for the Russian Federation. The Institute latest research developments cover a wide range of up-to-date information technologies:

- technology and software environment for aggregation, normalization and analysis of big arrays of heterogeneous structured, semi-structured and unstructured data that is intended for monitoring and security management of the consumer electronic devices' distributed network;

- technology of Big Data analysis and processing intended for solving the problems of regularities' detection, machine learning, estimation models' construction, prognostication, and decision-making over a finite set of alternatives;

- technology of building the decision-making support systems based upon the reciprocity (communication) between man-machine cloud services within the ontology oriented intelligent spaces, that use a “blackboard” concept for exchange of information;

- technology of supporting the communication between autonomous robot systems and users in a group behavior within a surrounding cyber-physical space the cloud services and resources are incorporated into. As a technological base are used the multi-agent architecture and five level model of software-communication infrastructure;

- design technology for the on-board computational module SMARC-AM335x notable for its use of an external real-time microchip; independent feed system, low cost, small overall dimension (82*50*5 mm), low power consumption (2-3 W) at the processor frequency up to 1000 MHz; DDR3 on-line storage up to 1024 MB, nonvolatile storage up to 8 GB, supporting the external interfaces of peripheral units (USB, UART, ADC, GPIO, Ethernet and other) meant for the sensor information processing and activation units’ control in the embedded systems and mobile robot complexes;

- technology and computer system for a paralinguistic analysis of natural speech meant for an automatic speech-based recognition of persons’ emotional states and classification of the speech paralinguistic phenomena;

- technology of import substitution of hardware components by their software realizations based on a being developed concept of software determinate systems;

- technology and software complex for solving the mathematical problems of prognostic evaluation, analysis and synthesis of the systems’ and processes’ characteristics and their functioning based upon their operation features’ indices;

- technology evaluating the information system’s stability under socio-engineering attacking impacts.

The above technologies are ready for realization; many of them are already implemented by domestic and international R&D and industrial organizations. It is worth noting that many developments are solving the import substitution problem.

Certain part of the developments is of the twofold purpose, and some are used in the products’ serial manufacturing, for instance, the system of information protection against the unauthorized access, the system of information guaranteed destruction, the on-board computational module SMARC-AM335x.

The Institute is obviously one of the leading Russian scientific research organizations in the field of society informatization. The Institute scholars developed informatics’ scientific and methodological basics,

the concept of informatization of the city of St. Petersburg and proposed the ways of its realization, the strategy of its transition to the information society, conceptual frameworks of the information policy accepted by 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 development basis (RDB) 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 39 years the Institute researchers published over 110 monographs and 1100 papers with domestic (“Nauka”, “Mashinostroenie”, etc) and international (“Springer-Verlag”, “Kluwer”, CRC Press, etc.) publishers. SPIIRAS prints its own transactions, and over 90 collected articles were published over 39 years time span. Since 2006 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, 38 full professors and 58 scientists bearing Ph. D. degrees. SPIIRAS members are bestowed 32 governmental awards, among them twelve honorary titles of the Honored Scientist of The Russian Federation. Nine researchers are the RF Government Prizes winners, ten - are awarded the scholarships of the Presiden of the Russian Federation, eight – received the RF President Grants.

Currently, the SPIIRAS post-graduate course counts 30 post graduate students, also functions the institution of doctoral candidacy.

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:

- 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

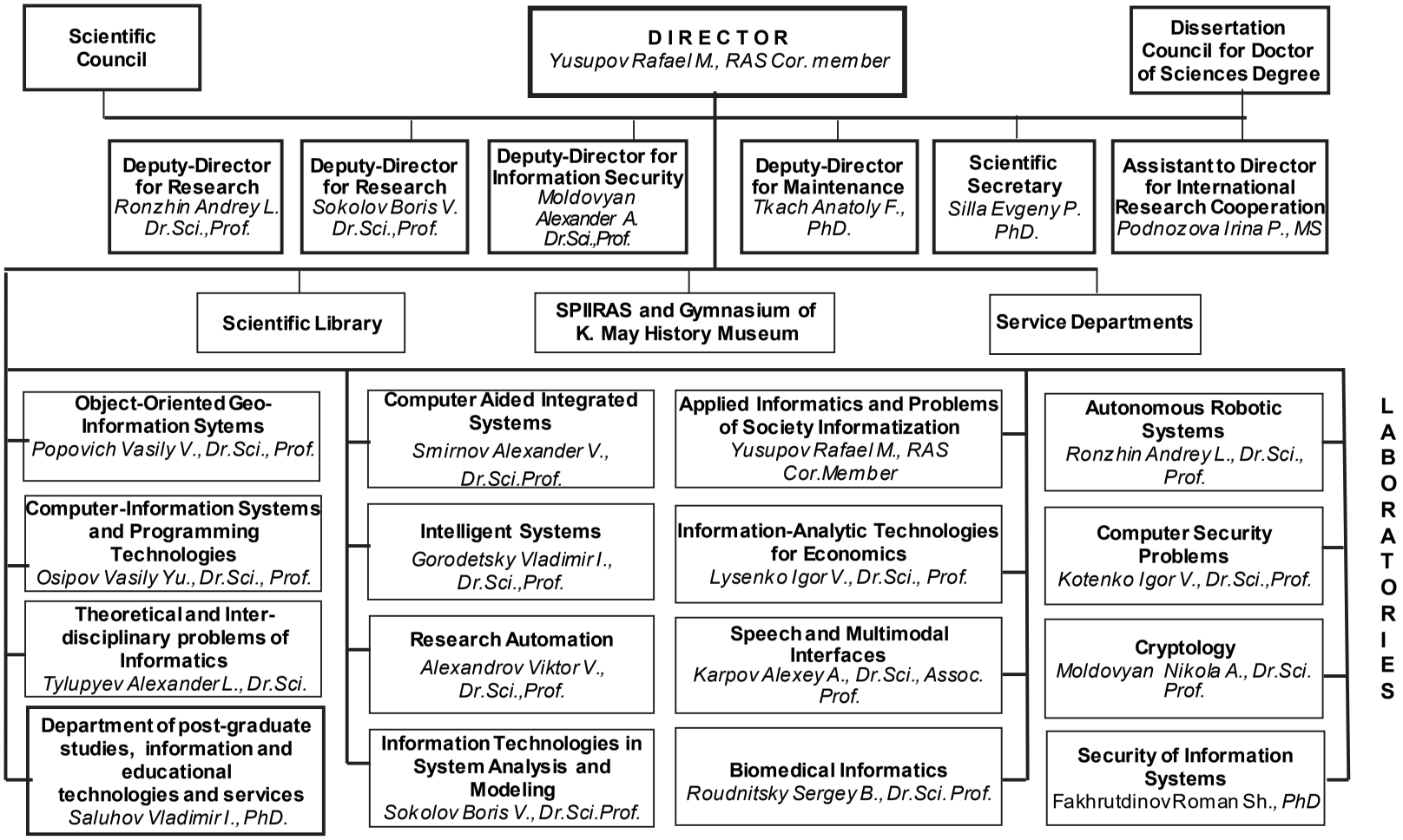
a) direction “Methods and systems for information security, information assurance”(05.13.19).

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 (1856-1918) 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 2016



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 Managed and Hosted by SPIIRAS in 2016:

- II Interregional Theoretical and Practical Conference: “Advanced Lines of Development in National Information Technologies”, http://pnroit.code-bit.com/. Sevastopol (Crimea), September 13-17, 2016 *(Yusupov, R.M.)*
- 9-th Multi-Conference “Information Technologies in Control (ITC-2016)” within the 7-th Russian Multi-conference on Control Problems (RMCCP 2016). St. Petersburg (Russia), October 04-06, 2016 *(Yusupov, R.M).*
- 18-th International Conference “Speech and Computer” SPECOM-2016. http://specom.nw.ru/. Budapest (Hungary), August 23-27, 2016 *(Ronzhin, A.L.)*
- 1-st International Conference “Interactive Collaborative Robotics” ICR-2016. http://specom.nw.ru/icr. Budapest (Hungary), August 23-25, 2016 *(Ronzhin, A.L.)*
- XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg (Russia), October 26-28, 2016 *(Yusupov, R.M.)*
- 13-th International Symposium on Neural Networks, ISNN 2016, http://cs.cityu.edu.hk. St. Petersburg (Russia), July 06-08, 2016 *(Ronzhin, A.L.; Karpov, A.A.).*
- 2-nd International School for Young Scientists “Incident Management and Counteraction to Target Cyber and Physical Attacks in Distributed Large-Scale Crucially Important Systems”, The Russian Science Foundation (RSF) Grant No.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), October 31-November 02, 2016. *(Kotenko, I.V.)*

Furthermore, 50 SPIIRAS scientists and professionals participated in over 40 other international conferences, workshops and meetings as invited speakers, speakers and program committees’ members.

Conferences and Workshops to be Organized by SPIIRAS in 2017

- 19-th International Conference “Speech and Computer“ SPECOM-2017. http://specom.nw.ru/. Hatfield (England, UK), September 12-16, 2017 *(Ronzhin, A.L.)*

- 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.)*
- 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.)*
- 3-rd International School for Young Scientists “Incident Management and Counteraction to Target Cyber and Physical Attacks in Distributed Large-Scale Crucially Important Systems”, The Russian Science Foundation (RSF) Grant No.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.)*
- VII All-Russian 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.)*

International Cooperation

In 2016 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 addi-

tion 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 Ukrainian National Academy of Sciences (UNAS); the Kazakh Academy of Sciences; the Uzbek Academy of Sciences; Novi Sad University (Serbia), Riga Technical University (Latvia); Research Economic Institute in Poznan (Poland); University Paris-VII, Research Institute for Informatics in Grenoble, LIMSI-CNRS, University Paul Sabatier, Toulouse III (France); Jonkoping University (Sweden); the University of Berlin, Fraunhofer Institute, Oberwolfach International Mathematic Institute, Rostock University; Bremen University, Ulm University (Germany); Yale University, EMS Company (USA); University of West Bohemia in Plzen (Czechia); a number of EC institutions in Spain, Italy, Poland, Portugal, Finland, institutions in China, Bogazici University in Turkey and other.

The research works were done on the contracts and orders by EMC 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 “SAMSUNG Research Center”, Ltd (Korea); 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 66 business trips of 40 SPIIRAS scientists (52 trips to International Conferences, Congresses, Workshops and Exhibitions). 11 trips had been related to the current research contract/agreements/grants; three trips concerned research internships.

In turn SPIIRAS received quite a few international scholars, for instance, visa support had been arranged for 48 scientists and professionals; at that, directly at the Institute 31 scientists had been received, including three – from Belarus, one – from Vietnam, nine – from Germany, five from Kazakhstan, four – from the USA, two – from Ukraine, one –

from Finland, one – from France, two- from Czechia, one – from Sweden, one – from South Africa, one – from Japan.

Links with the Higher School and Branch Science

The Institute administers four basic departments in the leading St. Petersburg universities as well as several joint research laboratories.
Basic Departments:

- "Information Technologies and Computer Security" 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

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.
- 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, A. F. 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 2016 year the Institute received 43 grants from the Russian Foundation for Basic Research, three grants as subsidies from the RF Ministry of Education and Science, two grants of the Russian Federation President and three grants from the Russian Science Foundation.

Major Publications

Monographs Published by SPIIRAS Scientists:

1. Azarov, A.A., Tulupyeva, T.V., Suvorova, A.V., Tulupyev, A.L., Abramov, M.V., Yusupov, R.M. Social engineering attacks. The problems of analysis. - SPb: Nauka, 2016. - 352 p.
2. Svinyin, S.F. Theory and metods of infinitive spectrum signals sampling. – SPb: Nauka, 2016. – 71 p.
3. Shpakov, V. M. The Computer Implementation of Processes. Saarbrucken: Palmarium Academic Publishing, 2016. - 244 p.
4. The strategic vector of ensuring international information security. Collected articles / [composed by Vus, M.A., Makarov, O.S.] / Introduction by Corresponding Member of RAS Yusupov, R.M. – SPb: SPIIRAS. Publishing House "Anatolia", 2016. – 122 p.
5. Bachilo, I. L., Bondurovsky, V. V., VUS, M. A., Lepyokhin, A. N., Makarov, O. S., Perevalov, D. V. A paradigm for the legal regulation ensuring the international information security by example of CIS and CSTO experience. Makarov, O. S. (Ed.) – Minsk: INS RB, 2016. - 344 p.

Manuals and Teaching Aids:

1. Tampel, I. B, Karpov, A. A. Automatic Speech Recognition. Tutorial. – SPb, ITMO University, 2016. - 138 p.

Conference Proceedings, SPIIRAS Proceedings:

- 18-th International Conference “Speech and Computer” - Springer International Publishing Switzerland. A. Ronzhin et al.(Eds): SPECOM 2016, LNAI 9811, 2016. -746 p. http://link.springer.com/book/10.1007/978-3-319-43958-7
- 1-st International Conference “Interactive Collaborative Robotics” - Springer International Publishing Switzerland. A. Ronzhin et al. (Eds.): ICR-2016, LNAI 9812, 2016. - 262 p. http://link.springer.com/book/10.1007/978-3-319-43955-6.

- Printed materials of the II Interregional Theoretical and Practical Conference. Sevastopol, September 13-17, 2016 – Sevastopol State University. B. V. Sokolov (Ed.) – Sevastopol: SevGU, 2016. - 148 p.
- Collected printed materials (articles' synopses) of the XV Jubilee St. Petersburg International Conference "Regional Informatics (RI-2016)". Sovetov, B. Ya., Yusupov, R. M., Zabolotsky, V. P., Kasatkin, V. V. (Eds.) – St. Petersburg, October 26-28, 2016: Conference Materials. SPOISU - SPb, 2016. - 599 p.
- Collected articles of the XV Jubilee St. Petersburg International Conference "Regional Informatics (RI-2016)". Issue 2. Sovetov, B. Ya., Yusupov, R. M., Zabolotsky, V. P., Kasatkin, V. V. (Eds.). SPOISU - SPb, 2016. - 491 p.
- Printed materials of the 9-th conference "Information Technologies in Control" (ITC-2016) – SPb: "Concern "CNII "Electropribor"", 2016.-895 p.
- Proceedings of the 13-th International Symposium on Neural Networks – Advances in Neural Networks .Springer International Publishing Switzerland. Long Cheng, Qingshan Liu, Andrey Ronzhin (Eds.): ISNN 2016, LNCS 9719, 2016. - 741 p.
  http://link.springer.com/book/10.1007/978-3-319-40663-3

Print Media and Electronic Media – "SPIIRAS Proceedings" Journal (in VAC list since 2011, in international database SCOPUS since 2016) – 6 issues:

- SPIIRAS Proceedings. Vol. 1(44)/. St. Petersburg: Publishing centre GUAP, 2016. 14,0 p. sh.
- SPIIRAS Proceedings. Vol. 2(45)/. St. Petersburg: Publishing centre GUAP, 2016. 14,2 p. sh.
- SPIIRAS Proceedings. Vol. 3(46)/. St. Petersburg: Publishing centre GUAP, 2016. 15,25 p.sh.
- SPIIRAS Proceedings. Vol. 4(47)/. St. Petersburg: Publishing centre GUAP, 2016. 14,0 p.sh.
- SPIIRAS Proceedings. Vol. 5(48)/. St. Petersburg: Publishing centre GUAP, 2016. 14,0 p.sh.
- SPIIRAS Proceedings. Vol. 6(49)/. St. Petersburg: Publishing centre GUAP, 2016. 14,0 p. sh.

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. 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.

2016 Honours and Awards

Kuleshov, S.V. - Prize of the St. Petersburg Government, in nomination of natural and technical sciences – the "Prize for young scientists named after L. Euler" (Ordinance No. 406 of May 25, 2016)

Karpov, A. A. – Grant of the President of the Russian Federation No. MD-3035.2015.8 "Development of software for a multimodal assistive technology aimed at helping people with disabilities", 2015-2016.

Kipyatkova, I. S. – Grant of the President of the Russian Federation No. MK-5209.2015.8 "Development of a neural network based Russian language model for a speech-to-text conversion system", 2015-2016.

Budkov, V.Y. – Grant of the President of the Russian Federation No. MK-7925.2016.9 "Mathematical support and software for evaluating speech truthfulness in a speech flow", 2016-2017.

Ronzhin, Al. L. – Scholarship of the President of the Russian Federation No. SP-3872.2015.5 "Development of the mathematical support and software for automation of audiovisual data processing aimed at maintaining events in intelligent room", 2015-2018.

Smoktiy, O. I. – Order of Honour for a significant contribution into development of science, education, training of highly qualified professionals and many years fruitful professional activity. Presidential Decree of January 29, 2016

Ronzhin, A. L. - Winner of the contest for the Government of St. Petersburg prize in the field of scientific and educational activities in 2016.

Karpov, A.A. – Winner (1-st Place) of the international scientific contest: Interspeech Computational Paralinguistics Challenge (ComParE-2016) in "Sincerity Sub-Challenge", San Francisco, USA, September 2016

Karpov, A.A. – Winner's Diploma of the contest "The best young scientist of the ITMO University of 2015".

Saenko, I. B., Kotenko, I. V. - Best Paper Award bestowed at the International Symposium of Mobile Internet Security (MobiSec 2016). Taichung, Taiwan. July 14-15, 2016.

Desnitsky, V. A., E. Novikova, E. S. - Winners of the 2016 contest for subsidy's provisions to young scientists, young candidates of sciences at higher schools and academic institutions located in St. Petersburg.

Doynikova, E. V. - Finalist of the "Youth Prize of St. Petersburg" in the nomination of science and technology in 2016. Awarded a diploma of the St. Petersburg Public Chamber.

Bulgakov,M. V. - Winner of the annual competition of scientific achievements of students and graduate students of ETU "LETI" in the University scientific and educational areas of 2016.

Levshun, D. C. - Winner of the creative projects' contest of ETU "LETI" students in the field of science, technology and innovations in 2016.

Levshun, D. C. - Winner of the annual competition of scientific achievements of students and graduate students of ETU "LETI" in the University scientific and educational areas of 2016.

D. Levshun and A. Chechulin - Best paper award bestowed at LXIII International Theoretical and Practical Conference "Innovations in Science", Novosibirsk, Russia.

Malchevskaya E.A., Tulupyev A.L., Berezin A.I. – Best Paper Award bestowed at IITI'2016 conference.

Vus, M. A. – Commemorative Badge "70 Years of the National Security Institute, Republic of Belarus".

Levonevsky, D. K. - Commemorative Badge "70 Years of the National Security Institute, Republic of Belarus".

Shishkin, V. M. - Commemorative Badge "70 Years of the National Security Institute, Republic of Belarus".

Main Research Results of Laboratories

Laboratory of Research Automation

Head of Laboratory before 01/11/2016: Dr. Sci. (Tech), Honored Scientist of the Russian Federation, winner of John von Neumann prize, winner of the Russian Federation Government prize in science and technology Prof. Victor V. Alexandrov – algorithmic models, digital programmed infocommunication, informatics, infology, epistemology of growing infocommunication systems, NBICS technologies. alexandr@iias.spb.su, http://sial.iias.spb.su.

From 01/11/2016 Dr.Sci (Tech), winner of the St. Petersburg Government prize: "Prize for young scientists named after L. Euler" – Sergey V. Kuleshov – analytical Internet monitoring, data processing, digital software defined infocommunication systems, kuleshov@iias.spb.su

Laboratory Staff – 8 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. Infology approach to information analysis systems developing, analytical monitoring of Internet media. 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 for digital signal processing.

Research Fellows

Chief Researcher from 01/11/2016 Dr. Sci. (Tech) Prof. Victor V. Alexandrov – algorithmic models, digital programmed infocommunication, informatics, infology, epistemology of growing infocommunication systems, NBICS technologies, alexandr@iias.spb.su

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

Leading Researcher before 01/11/2016 Dr.Sci (Tech) Sergey V. Kuleshov – analytical Internet monitoring, data processing, digital software defined infocommunication systems, kuleshov@iias.spb.su

Senior Researcher PhD (Tech) Alexandra A. Zaytseva – data processing, digital technologies of cognitive programming, methods of 3D data digital processing, cher@iias.spb.su

Researcher PhD (Tech) Pavel P. Kokorin – infology information systems, kokorin@list.ru

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

Grants and Projects

Alexandrov, V. – contract No.1/2016. Reference number: “Alebarda-S”. Analysis and developement of algorithms and software for transport stream processing used in modern television broadcasting, 2016.

Alexandrov, V. – RFBR project No. 16-29-09482-ofi_m “Prediction of the network-based terrorist threats appearance and elaboration of countermeasures in metropolises”, 2016–2018 (research team member).

University Courses

SPSPTU, Department of Control Systems and Technology: Computer and cognitive systems; Knowledge engineering; Intellectual systems for data processing (Victor V. Alexandrov).

Conferences

5th Computer Science Online Conference 2016 (CSOC 2016), Czech Republic, April 27–29, 2016 г. – Alexandrov, V., Aksenov, A., Zaytseva, A., Kuleshov, S.

Conference on Information Technologies in Control (ITC), October 4–6, 2016, St. Petersburg – Alexandrov, V., Zaytseva, A., Kuleshov, S.

2-nd International Scientific Conference “Technological perspective within the frame of Eurasian space: new markets and points of economical growth”, St. Petersburg, October 20-22, 2016 – Alexandrov, V., Aksenov, A., Zaytseva, A., Kuleshov, S.

XV Jubilee St. Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016 — Alexandrov, V., Zaytseva, A., Kuleshov, S., Svinyin, S.

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

Victor V. Alexandrov – active member of the Russian Academy of Natural Sciences. Editorial board member of “Scientific Instrumentation” journal.

Sergey F. Svinyin – member of St. Petersburg Assotiation of Scientists scientific council, chairman of St. Petersburg Department of Lomonosov’s Foundation, member of international scientific society “Euroscience”.

Sergey V. Kuleshov – Expert of RAS.

Intellectual property registered in the reporting year

The certificate of state registration of an electronic resource No. 2016619368 of August 18, 2016, “Software for recursive generation of three dimensional space filling curve”, Kuleshov, S., Zaytseva, A., Aksenov, A.

The invention patent No. 2587724 of May 27, 2016, “Digital biometry complex for aircraft pilots functional state assesement”, Chuntul, A., Alexandrov, V., Kuleshov, S., Zaytseva, A.

Recent results

1. The approach to import substitution of hardware parts by their software realization based on a concept of program defined systems is proposed [4, 5, 8, 13].
2. The method of dynamic partitioning and scaling of clouds of points is proposed accounting for the specifics of optical contactless 3D scanning technology [3, 15].
3. The software defined method for realtime remote aircraft monitoring reducing the limit of simultaneously monitored aircraft is proposed [6, 9, 13].
4. The approaches to developing the software reconfigured telecommunication systems using the concept of active data is proposed which provide an access to telecommunication services in the areas without public cellular coverage and special radio or satellite in which the broadcasting equipment [2, 9, 13].
5. The architecture of software defined camera is developed where digital signal processor besides the tasks of processing the data obtained from sensor also controls all of the camera components in order to obtain needed optical and information features [7].
6. The methodology and analysis of Internet content growth properties and problems of its automated analysis on current level of Internet technologies are proposed and carried out. The updated methods for text quality assessement are proposed [12, 14, 16].
7. The foundation for multidimensional signals sampling theory are developed based on mathematical apparatus of spline-wavelets [1, 10, 11].

Awards and scholarships

Prize of the St. Petersburg Government in nomination of natural and technical sciences – the “Prize for young scientists named after L. Euler” (Ordinance No. 406 of May 25, 2016) – Kuleshov, S.V.

References

Monographs

1. Svinyin, S.F. Theory and metods of infinitive spectrum signals sampling. – SPb.: Nauka, 2016. – 71 p.

Publications indexed in WoS, Scopus

2. Alexandrov, V.V., Kuleshov, S.V., and Zaytseva, A.A. Active Data in Digital Software Defined Systems Based on SEMS Structures. //

Logical Analysis of Data and Knowledge with Uncertainties in SEMS – Gorodetskiy, A.E. (ed.), Smart Electromechanical Systems, Studies in Systems, Decision and Control 49, 2016, pp. 61-69. DOI 10.1007/978-3-319-27547-5_6

3. Alexandrov, V.V., Kuleshov, S.V., Aksenov, A. J., Zaytseva, A.A. The Method of Lossless 3D Point Cloud Compression Based on Space Filling Curve Implementation // Automation Control Theory Perspectives in Intelligent Systems // Year: 2016, Vol. 466 of the series Advances in Intelligent Systems and Computing. pp. 415-422. DOI 10.1007/978-3-319-33389-2_39
4. Serguei Levashkin; Viktor Alexandrov; Adolfo Guzman. Kolmogorov's Theory of Computer Science. IEEE Latin America Transactions. Year: 2016, Volume: 14, Issue: 3. pp. 1447 – 1453

Publications indexed in Russian Science Citation Index

5. Kuleshov, S.V., Yusupov, R.M. Is Softwarization the Way to Import Substitution? // SPIIRAS Proceedings. 2016. Issue. 3(46). p. 5-13.
6. Kuleshov, S.V., Zaytseva, A.A., Aksenov, A.Y. The Technology of the Remote Real-Time Monitoring of the Manned Aircraft Spatial Position and Onboard Systems Status. // Intellectual Technologies on Transport. 2016. No. 2(6). pp. 43-49.
7. Kuleshov, S.V., Aksenov, A.J., Zaytseva, A.A. An Approach to the Software Defined Camera Creation (review). // Nauchnoe Priborostroenie, 2016, Vol. 26, No. 3. pp. 44-49.
8. Alexandrov, V.V., Kuleshov, S.V., Yusupov, R.M. Software-Defined Environments Technology and Import Substitution // Informatization and communication, 2016, No. 3. pp. 82–85.
9. Kuleshov, S.V., Zaytseva, A.A. Software Reconfigurable Formats in Telecommunication Systems // Innovative science, 2016, No. 12, Vol. 2. pp. 75–80.

Other publications

10. Svinyin, S.F., Alexeev, A.V., Popov, A.I., Fedorchenko, L.N. The theory of Information: from Whittaker-Kotel'nikov-Shannon Theorem to the Theory of Information Space Management. // Proceedings of the XV Jubilee St. Petersburg International Conference "Regional Informatics (RI-2016)". SPb, 2016. pp.49-50.
11. Svinyin, S.F., Zainitdinov, H.N., Hamdamov, U.R. Spline-Wavelets and their Application to Signal Restoration from Discrete Samples // Proceedings of the XV Jubilee St. Petersburg International Conference "Regional Informatics (RI-2016)". SPb, 2016. pp. 291-292.
12. Alexandrov, V.V., Zaytseva, A.A. The Development of Approaches to Reveal Cultural Canons of Different Social Groups Based on Analytical Self-Reference Methods // Proceedings of the XV Jubilee

St. Petersburg International Conference "Regional Informatics (RI-2016)". SPb, 2016. pp. 283.
13. V.V. Alexandrov, S.V. Kuleshov. Digital Programmed Electronics // Proceedings of XV Jubilee St. Petersburg International Conference "Regional Informatics (RI-2016)". SPb, 2016, pp. 284.
14. Alexandrov, V.V., Afanasiev, A.V. Intelligent System of Text Quality Analysis using Machine Learning Methods // Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of the 2-nd International Scientific Conference. Prof. Alexandrov, A.A., Alexankov, A.M., Prof. Barabanova, M.I., Prof. Voronova, N.S., Gorlushkina, N.N., Zaytseva, A.A., Prof. Ignatiev, M.B., Prof. Korableva, O.N., Prof. Shelepin, J.E., Prof. Yakovleva, E.A. (Eds.) - SPb: "Asterion", 2016. pp. 283–286.
15. Zaytseva, A.A., Aksenov, A.J., Kourneva, D.A. Photogrammetry vs Laser 3D-scanning // Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of the 2-nd International Scientific Conference. Prof. Alexandrov, A.A., Alexankov, A.M., Prof. Barabanova, M.I., Prof. Voronova, N.S., Gorlushkina, N.N., Zaytseva, A.A., Prof. Ignatiev, M.B., Prof. Korableva, O.N., Prof. Shelepin, J.E., Prof. Yakovleva, E.A. (Eds.) – SPb: "Asterion", 2016. pp. 286–290.
16. Aksenov, A.J., Zaytseva, A.A., Kuleshov, S.V. The Features of Internet Content Formation and the Problem of its Automatic Analysis // Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of the 2-nd International Scientific Conference. Prof. Alexandrov, A.A., Alexankov, A.M., Prof. Barabanova, M.I., Prof. Voronova, N.S., Gorlushkina, N.N., Zaytseva, A.A., Prof. Ignatiev, M.B., Prof. Korableva, O.N., Prof. Shelepin, J.E., Prof. Yakovleva, E.A. (Eds.) – SPb: "Asterion", 2016. pp. 309–311.
17. Kuleshov, S.V., Pavlov, I.J. On the Estimation of a Person Psychophysiological State Based on the Measurement of Heart Rate Variability // Technological perspective within the frame of Eurasian space: new markets and points of economical growth. Proceedings of the 2-nd International Scientific Conference. Prof. Alexandrov, A.A., Alexankov, A.M., Prof. Barabanova, M.I., Prof. Voronova, N.S., Gorlushkina, N.N., Zaytseva, A.A., Prof. Ignatiev, M.B., Prof. Korableva, O.N., Prof. Shelepin, J.E., Prof. Yakovleva, E.A. (Eds.) – SPb: "Asterion", 2016. pp. 290–292.

Intelligent Systems Laboratory

Head of Laboratory: Dr. Tech. Sci**.** PhD Prof. Gorodetsky, Vladimir – Artificial Intelligence, in particular, Intelligent Data Analysis, Data and Information Fusion, P2P agent-based service oriented technology, Distributed and P2P Data Mining and Machine Learning, Knowledge Discovery from Data, Multi-Agent System Technology and Software Tools, Distributed Pattern Recognition, Self-organized B2B Networks, 3G Recommending systems, Big Data Analysis, Teamwork of agents.
gor@iias.spb.su, http://space.iias.spb.su/ai/gorodetsky.

Laboratory staff – 8 members.

Research Activities

Multi-agent system technology, Multi-agent logistics, Self-organized B2B Networks, Distributed and P2P Data Mining and Machine Learning, Intelligent Data Analysis, Data and Information Fusion, Knowledge Discovery from Data, Intelligent Transportation Systems, Big Data Analysis, Teamwork of agents, 3G Recommending Systems, Mobile document images enhancement.

Research Fellows

Senior Researcher Ph.D. – Karsaev, Oleg – Artificial Intelligence, Multi-agent Systems and Software Tools, Multi-agent Applications in Transportation Logistics, Intelligent Planning and Scheduling, Air Traffic Control, P2P architectures and protocols, Small satellite control. ok@iias.spb.su.

Researcher – Tushkanova, Olga – Artificial Intelligence, in particular, Multi-agent system technology, Big Data Processing, Big Data Semantic Modeling, Association and Causal Analyses, Pattern Recognition, Ontology Development, Programming, tushanova@iias.spb.su.

Researcher – Samoylov, Vladimir (part time) – Artificial Intelligence, in particular, Big Data processing, Data ontology design, Ontology-based Data Analysis, Data and Information Fusion, Distributed and P2P Data Mining and Machine Learning, Knowledge Discovery from Data, Multi-Agent System Technology and Software Tools, Transportation Logistics, Mobile document images enhancement. samovl@iias.spb.su

Researcher – Kislyakov, Vakhtang – Artificial Intelligence, Ontology Design Automation, Intelligent Planning and Scheduling, Programming, Data Bases. vakh@iias.spb.su.

Junior Researcher – Bukhvalov, Oleg (part time) Artificial Intelligence, in particular, Multi-agent Systems, Agent Platforms, B2B networks, Teamwork of Robots, Programming, Transportation Logistics, psychoveter@gmail.com.

Junior Researcher – Boykov, Leonid (part time) – Artificial Intelligence, in particular, Multi-agent Systems, Agent Platforms, Teamwork of Robots, Robot Programming, Software Development, boykov@iias.spb.su.

Junior Researcher – Bashlovkina, Valeriya (part time) – Computer Vision of Robots, 3D Scene Reconstruction, Teamwork of agents, Robot Programming, bash@iias.spb.su.

Post-graduate Students

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

Bashlovkina, Valeriya – Computer Vision of Robots and Cognitive 3D Scene Reconstruction (Supervisors Gorodetsky, Vladimir, and Stankevich, Lev).

Grants and Projects

Gorodetsky, Vladimir – Self-organized B2B networks. Project from the Russian Foundation for Basic Research, No. 10-07-00493 (2014-2016).

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

Gorodetsky Vladimir – Contract from EMC^2 Company, USA (2016).

Conferences, exhibitions

Russian Conference on Perspective Control Systems and Tasks, April 2-9, 2016, Eupatoria – Gorodetsky, V.

International Conference on Autonomous Agents and Multi-agent Systems (AAMAS-2016), Singapore, May 9–13, 2016 – Gorodetsky, V.

International Workshop “Agent and Data Mining Interactions”. Singapore, May 8, 2016 – Gorodetsky, V.

International Congress on Artificial Intelligence and Information Technologies. (AIS-2016), Divnomorskoe, September 2-9, 2016. – Gorodetsky, V. (invited paper presentation).

XVIII International conference “Control and Simulation Problems in Complex Systems”. September 20-25, 2016, Samara, Russia – Gorodetsky, V. (co-author of a presentation).

Inter-regional Conference “Perspective Directions of Information Technologies in Russia”, Sevastopol, September 13-17, 2016. – Gorodetsky, V. (invited paper presentation).

Russian Conference “Information Technologies for Control”. St. Petersburg, Russia October 4-7, 2016. – Gorodetsky, V. (invited paper presentation).

International Conference “Extreme Robotics”, November 24–25, 2016, Central Research Institute for Robotics and Technical Cybernetics (CRI RTC) St. Petersburg, Russia – Boykov, L. and Bashlovkina, V.

International Cooperation

University of Technology, Sydney (Sydney, Australia) – Coordinated actions in organizing of the International Workshop on Agent and Data Mining Interaction (ADMI-2016), Singapore, May 9–13, 2016, Gorodetsky, Vladimir – Co- Chairman of the Workshop.

Joint editing and publication of the issue “Agent and Data Mining Interaction”, Lecture Notes in Artificial Intelligence, Vol. 9145, Springer, 2016.

EMC^2 Company, USA – R&D contract for 2016.

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

Prof. Gorodetsky, Vladimir – 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), member of Editor Board of Journal on "Design Ontology", Editorial Board member of the International Journal “Data Science and Analytics”, Springer.

Recent Results

1. The set of technologically ordered scalable, efficient and stable algorithms intended for Big Data processing to solve data mining and machine learning task for data values assessment and prediction as well as for decision making are developed. The Big Data processing technology comprises (1) task-driven adaptive granulation algorithms, (2) application-driven ontology-based semi-automatic semantic data metamodel and data structure design algorithm, (3) causal association discovery in Big Data and (4) optimization of causal decision making model

algorithm. The algorithms are designed to process heterogeneous data of big sizes and dimensionalities including natural language texts. The Java-based software library implementing all the algorithms is developed. The developed complex of algorithms and software are validated experimentally using real-life Big Data sets.

2. Conceptual model, multi-agent architecture and five-level model of the software-communication platform intended for support of the interaction of robot - robot and robot - external environment is developed. It is designed to support cloud robotics providing, for robots, with access to cloud resources and services. The proposed software implementation technology is based on use of *Akka* environment together with Akka Clus*ter* model making it possible to efficiently implement the basic services of the software – communication infrastructure. White page service, yellow page service, as well as communication p2p service are among them.

References

Papers Published in Editions Indexed by WoS, Scopus

1. Oleg Karsaev, Boris Morozov, Rustem Sabitov, Gulnara Smirnova, Natalya Elizarova, and Natalia Bakhtadze. “Multi-Agent Simulation of SWAP BODIES Application in Manufacturing Supply Chain”. Proceedings of the 8th IFAC Conference on Manufacturing Modeling, Management and Control // IFAC-PapersOnLine. 2016. Vol. 49, No. 12. pp. 1245–1250.

Papers Published in Russian Editions Indexed by RSCI

2. Gorodetsky, V., Bukhvalov, O., Skobelev, P. Current State-of-the-Art and Perspectives of Industrial Applications of Multi-agent Systems. Large Scale Systems Control, No. 1, 2017, 65 p. (Accepted).
3. Gorodetsky V., Bukhvalov O. Self-organized B2B-Networks: Conception, Architecture and Algorithmic Support, 35 p. (Submitted).
4 Gorodetsky, V., Tushkanova, O. Efficient Method for Big Data Processing for Decision Making. Proceedings of Plenary Talks of the Russian Conference “Intelligent Control Systems”. St. Petersburg, October 4 – 7, 2016. pp. 74-96.
5. Gorodetsky, V., Skobelev, P., Bukhvalov, O. Industrial Application of Multiagent Systems: Prognoses and Reality. Proceedings of XVIII International Conference “Control and Simulation Problems in Complex Systems”. September 20-25, 2016, Samara, Russia. pp. 137-162.

6. Gorodetsky, V. I. Control of Robots' Collective Behavior in Autonomous Mission. Journal "Robotics and Technical Cybernetics", No. 1(10). 2016. pp. 40-54.
7. Gorodetsky, V., Bukhvalov, O. Conceptual Model and Architecture of Infrastructure Supporting Robot Group Control. Journal "Robotics and Technical Cybernetics", No. 4(10). 2016. 15 p.
8. Karsaev, O.V. Review of Traditional and Innovative Satellite Mission Planning Systems. SPIIRAS Proceedings, Vol. 5(48), 2016. pp. 151 – 181.
9. Karsaev, O.V. Conceptual Model of Satellites Individual and Group Behavior Autonomous Planning // Proceedings of Conference «Information Technologies in Control», St. Petersburg, 2016, pp. 355-364.

Other Publications

10. Karsaev O.V., Morozov B.M., Sabitov R.A., Smirnova G.S. Simulation of relay transportation system // Proceedings of the IV International Scientific and Practical Conference "Modern Systems of Life Safety: Intelligent Transport Systems", Kazan, 2016, pp. 279-290.
11. Gorodetsky, Vladimir, Tushkanova, Olga. Big Data Processing Technology. Proceedings of Interegional Conference "Perspective Directions of Information Technologies in Russia", Sevastopol, September 13-17, 2016.
12. Bashlovkina, V.V., Boykov, L.V., Stankevich, L.A. Platform Architecture for Robot Group Control. Proceedings of the XX-th International Scientific and Practical Conference on System Analysis for Engineering and Control. (SAEC-2016), 2016, St. Petersburg, Russia.
13. Bashlovkina, V.V., Boykov, L.V., Stankevich, L.A. Fault-tolerant Networked Architecture for Autonomous Robot Group Control. Proceedings of International Conference "Extreme Robotics" (ER-2016), 2016, St. Petersburg, Russia.

Laboratory of Speech and Multimodal Interfaces

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

Laboratory staff: 8 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 PhD – Irina Kipyatkova – methods for language and acoustic modeling for automatic Russian speech recognition systems, kipyatkova@iias.spb.su

Senior Researcher PhD – Viktor Budkov – methods and models of audio-visual signal processing in web-systems for supporting distributed meetings, budkov@iias.spb.su.

Senior Researcher PhD – Alexander Ronzhin – methods and software for automation of the audio-visual monitoring of meetings participants in the intelligent room, ronzhinal@iias.spb.su

Researcher PhD – Anton Saveliev – cross-platform software and mobile services for teleconferencing, saveliev@iias.spb.su

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

Junior Researcher – Alexander Denisov – methods and software for motion control of a robot with an anthropomorphic kinematic scheme

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

Defense of thesis

Anton Saveliev – “Architecture, algorithms and software for processing multimodal data streams in a peer to peer web video conferencing applications”, Ph.D. in spec. 05.13.11, research supervisor – Ronzhin, An.L.

Master Students

Bachelor and Master students at the Department of Neuroinformatics and Robotics of SPb SUAI-SPIIRAS: 6 (theses supervisors – Kipyatkova I.S., Ronzhin, Al.L.);

Master students at the Department of Speech Information Systems of the ITMO University: 3 (thesis supervisor – Karpov, A.A.).

Grants and Projects

Karpov, A.A. – Federal Targeted Program “Research and Development in Priority Areas of Development of the Russian Scientific and Technological Complex for 2014-2020”, Project No. 14.616.21.0056 (reference RFMEFI61615X0056) with The Ministry of Education and Science of the Russian Federation “Research and development of audio-visual speech recognition system based on a microphone and a high-speed camera”, 2015-2016.

Karpov, A.A. – Grant of the President of the Russian Federation No. MD-3035.2015.8 “Development of software for a multimodal assistive technology for helping people with disabilities”, 2015-2016.

Kipyatkova, I.S. – Grant of the President of the Russian Federation No. MK-5209.2015.8 “Development of a neural network based Russian language model for a speech-to-text conversion system”, 2015-2016.

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.

Verkhodanova, V.O. – Project of the Russian Foundation for Basic Research (RFBR) No. 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 No. 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 No. 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 No. 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 No. 16-37-60100-mol_a_dk «Development of a universal assistive information technology based on multimodal human-computer interfaces», 2016-2019.

Budkov, V.Y. – Project of RFBR No. 16-37-60085-mol_a_dk “Development of methods and software for estimating deception of transmitted voice messages”, 2016-2019.

Ronzhin, Al.L. – Scholarship of the President of the Russian Federation No. SP-3872.2015.5 “Development of the mathematical and software for automation of audiovisual data processing at meeting carrying out in an intelligent room”, 2015-2016.

Ronzhin, A.L. – RSF Project No. 16-19-00044 “Principles for the allocation of tasks between service robots and means of cyber-physical intelligent environment for the multimodal user support", 2016-2018 (in collaboration with the Laboratory of Autonomous Robotics Systems, Prof. Ronzhin, A.L.).

University Courses

SUAI University: Information systems; Automated information management systems (Dr. Kipyatkova, I.S., Dr. Ronzhin, Al.L.).

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

Conferences

18th International Conference “Speech and Computer” SPECOM-2016, August 23-27, 2016, Budapest, Hungary – Kipyatkova, I.S., Verkhodanova, V.O., Karpov, A.A. (conference co-organizers);

13th International Symposium on Neural Networks ISNN-2016, July 6-8, 2016, St. Petersburg, Russia – Kipyatkova, I.S., Budkov, V.Y., Karpov, A.A. (symposium co-organizers);

17th International Conference INTERSPEECH-2016, September 8-12, 2016, San Francisco, USA – Karpov, A.A.;

18th International Conference “Human-Computer Interaction”- HCI International 2016, July17-22, 2016, Toronto, Canada – Karpov, A.A.;

5th International Workshop “Spoken Language Technologies for Under-resourced Languages (SLTU-2016)”, May 9-12, 2016, Yogyakarta, Indonesia – Karpov, A.A.;

International Conference “Autonomous Robot Systems and Competitions ICARSC-2016”, May 4-6, 2016, Braganca, Portugal – Saveliev, A.I.;

1st International Conference “Interactive Collaborative Robotics” ICR-2016, August 23-25, 2016, Budapest, Hungary – Karpov, A.A.;

24th International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision WSCG-2016, May 30 – June 3, 2016, Pilsen, Czech Republic – Ronzhin, Al.L.;

7th ISCA International Workshop on Experimental Linguistics ExLing-2016, June 27- July 2, 2016, St. Petersburg, Russia – Verkhodanova, V.O.;

Conference “Information Technologies in Control (ITC-2016)” (as part of the 9th Multi-conference on Problems in Control MCPC 2016), October 4-6, 2016, St. Petersburg – Kipyatkova, I.S., Denisov, A.V., Ryumin, D.A., Karpov, A.A.; organization of the section «Information Technologies in Human-Computer Interaction»;

29th International Conference “Mathematical Methods in Engineering and Technology” (ICMMET-29), May 31-June 3, 2016, St. Petersburg – Saveliev, A.I., Denisov, A.V.;

26th International Conference “Extreme Robotics” (ER-2016), November 24-25, 2016, St. Petersburg – Karpov, A.A.;

XLV Scientific and Educational Conference of ITMO University, February 2-6, 2016, St. Petersburg – Karpov, A.A.;

III Russian Scientific and Practical Conference “Modern information technologies. Theory and Practice”, November 30, 2016, Cherepovets – Budkov, V.Y.;

4th Annual National Exhibition-Forum “VUZPROMEXPO-2016”, December 14-15, 2016, Moscow, Russia – Karpov, A.A.

International Cooperation

Joint research and organization of scientific events in co-operation with the University of West Bohemia in Pilsen (Czech Republic), Bogazici University (Turkey), Namık Kemal University (Turkey), University of Patras (Greece), Budapest University of Technology and Economics (Hungary), Dresden University of Technology (Germany), United Institute of Information Problems of the National Academy of Sciences of Belarus, Universidad Nacional Autonoma de Mexico (Mexico), Institute of Computer Science University of Bialystok (Poland), University of Aizu (Japan), A.Baitursynov Kostanai State University (Kazakhstan).

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

Karpov, A.A. – 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), Guest editor of Speech Communication (Elsevier) and Journal of Electrical and Computer Engineering (Hindawi) journals; Reviewer of International journals (IEEE/ACM Transactions on Audio, Speech and Language Processing; IEEE Transactions on Biomedical Engineering; Speech Communication; Computer Speech & Language; Language Resources and Evaluation; Soft Computing, etc.); Editorial board member of the journal "Speech Technology" (Moscow); Program committee chair of the International Conference on Speech and Computer SPECOM-2017; Technical Program Committee member of International conferences such as INTERSPEECH, ICASSP, ICPR, SLTU, SPECOM, ISNN, HBU, etc.

Kipyatkova, I.S. – technical/program committee member of the International Conferences INTERSPEECH, SPECOM, ISNN.

Intellectual Property registered Programs and Data Bases

Patent for invention No. 2597498 issued on August 10, 2016: Ronzhin, A.L., Karpov, A.A. "A method for speech recognition based on a two-level morpho-phonemic prefix graph".

Certificate on Software Registration No. 2016613811 issued on April 06, 2016 by Rospatent: Ronzhin, Al.L., Karpov, A.A., Kipyatkova, I.S. "Software for recording native speakers using a high-speed camera and a digital microphone (AVSpeechDBRecord)".

Recent Results

1. Hybrid acoustic models, in which Deep Neural Networks (DNN) are used for estimating the posterior probabilities of a Hidden Markov Model state, have been developed and studied. An implication of DNN with a various number of hidden layers, hidden units, and different activation functions is researched. The developed models were introduced in a very large vocabulary automatic Russian speech recognition system (the vocabulary size is more than 150K word-forms). The use of the hybrid models allowed decreasing a relative word error rate by 20% with respect to the baseline system with Gaussian mixture models. [8, 14, 22].

2. Methods for detection of filled pauses and lengthenings in spontaneous speech were developed basing on state-of-the-art machine learning techniques such as Extreme Learning Machines (ELM) and Support Vector Machines (SVM). Experiments were carried on the quality diverse corpus of spontaneous Russian speech, which comprises records of several types: spontaneous dialogues collected in SPIIRAS, spontaneous monologues from the Binghamton university speech corpus, scientific reports from the Bulletin of Phonetic Fund and from AR3 seminar. The experiments have proved that SVM method has efficiency advantages over ELM method for this task. F1-scores were 0.54 and 0.42 for SVM and ELM respectively [1, 7, 27].

3. A multipoint videoconferencing cross-platform application with peer-to-peer (P2P) architecture of communication between client parts has been developed. The application allows remote network subscribers to send multimedia data in the real-time mode, without using an intermediate server. The algorithms for connection of 3 or more network users was developed to ensure the prevention of signal loss of client data and to control service data buffering in the server and client parts of the videoconferencing system. The algorithms for generating and transmitting multimedia data have also been developed. These algorithms provide multimedia data sharing between application users in the real time [18, 20, 26].

4. New audio-visual database (corpus) of continuous Russian speech HAVRUS has been created. Audio-visual speech database was

recorded using the high-speed camera JAI Pulnix (provides 200 frames per second with the optical resolution of 640x480 pixels) and the dynamic microphone Oktava MK-012. The corpus contains synchronized audio and video signal recordings of continuous speech of over 20 native Russian speakers, as well as text transcriptions and temporal segmentation of the speech data [10, 6].

5. An improved computer system for paralinguistic analysis of speech has been developed. The system is intended for the automatic recognition of human's emotional states from speech and classification of speech paralinguistic phenomena. The system uses a set of state-of-the-art methods for extracting multiple informative features from audio signals, methods for filtering and normalizing data, as well as machine learning and automatic classification methods. The system was awarded 1st prize in the INTERSPEECH-2016 Computational Paralinguistics Challenge (ComParE-2016) in the "Sincerity Sub-Challenge" (September 2016, San Francisco, USA) [3, 5, 16].

Awards, certificates, scholarships

1. 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 in the field "Information and Telecommunication Systems and Technologies" (Certificate number MK-7925.2016.9 of the Council on grants of the President of the Russian Federation) – Budkov, V.Y.
2. Award of the winner of the INTERSPEECH-2016 Computational Paralinguistics Challenge (ComParE-2016) in the "Sincerity Sub-Challenge", San Francisco, CA, USA, September 2016 – Karpov, A.A.
3. Diploma of the winner of the competition "The best young scientist of the ITMO University for 2015" – Karpov, A.A.
4. Certificate of the Expert of the Russian Academy of Sciences (No. 2016-01-5816-4899) – Karpov, A.A.
5. Scholarship of the President of the Russian Federation No. SP-3872.2015.5 "Development of the mathematical support and software for automation of audiovisual data processing aimed at maintaining events in intelligent room", 2015-2018 - Ronzhin, Al. L.

References

Papers published in journals and editions, indexed by WoS, Scopus

1. Verkhodanova, V., Shapranov, V. Experiments on detection of voiced hesitations in Russian spontaneous speech // Journal of

Electrical and Computer Engineering. Hindawi, USA, Vol. 2016, 2016, Article ID 2013658. (Scopus SJR – 0,225).
2. Karpov, A., Kipyatkova, I., Zelezny, M. Automatic Technologies for Processing Spoken Sign Languages. In Proc. SLTU-2016, Indonesia. Procedia Computer Science. Elsevier, Vol. 81, 2016. pp. 201-207. (Scopus SJR – 0,314).
3. Kaya, H., Karpov, A. Fusing Acoustic Feature Representations for Computational Paralinguistics Tasks. In Proc. INTERSPEECH-2016, San Francisco, USA, 2016. pp. 2046-2050. (Scopus SJR – 0,275).
4. Kipyatkova, I., Karpov, A. Language Models with RNNs for Rescoring Hypotheses of Russian ASR. In Proc. 13th International Symposium on Neural Networks ISNN-2016, St. Petersburg, Russia, Springer LNCS, Vol. 9719, 2016. pp. 418-425. (Scopus SJR – 0,252).
5. Kaya, H., Karpov, A., Salah, A. Robust Acoustic Emotion Recognition based on Cascaded Normalization and Extreme Learning Machines. In Proc. 13th International Symposium on Neural Networks ISNN-2016, St. Petersburg, Russia, Springer LNCS, Vol. 9719, 2016. pp. 115-123.
6. Karpov, A., Ronzhin, Al., Kipyatkova, I., Ronzhin, A., Verkhodanova, V., Saveliev, A., Zelezny, M. Bimodal Speech Recognition Fusing Audio-Visual Modalities. In Proc. 18th International Conference on Human-Computer Interaction HCII-2016, Toronto, Canada, Springer LNCS, Vol. 9732, 2016. pp. 170-179.
7. Verkhodanova, V., Shapranov, V. Detecting Filled Pauses and Lengthenings in Russian Spontaneous Speech Using SVM. In Proc. 18th International Conference “Speech and Computer” SPECOM-2016, Budapest, Hungary, Springer LNCS, Vol. 9811, 2016. pp. 224-231.
8. Kipyatkova, I., Karpov, A. DNN-Based Acoustic Modeling for Russian Speech Recognition Using Kaldi. In Proc. SPECOM-2016, Budapest, Hungary, Springer LNCS, Vol. 9811, 2016. pp. 246-253.
9. Vatamaniuk, I., Levonevskiy, D., Saveliev, A., Denisov, A. Scenarios of Multimodal Information Navigation Services for Users in Cyberphysical Environment. In Proc. SPECOM-2016, Budapest, Hungary, Springer LNCS, Vol. 9811, 2016. pp. 588-595.

10. Verkhodanova, V., Ronzhin, Al., Kipyatkova, I., Ivanko, D., Karpov, A., Železný, M. HAVRUS Corpus: High-Speed Recordings of Audio-Visual Russian Speech. In Proc. SPECOM-2016, Budapest, Hungary, Springer LNCS, Vol. 9811, 2016. pp. 338-345.
11. Gruber, I., Hlaváč, M., Hrúz, M., Železný, M., Karpov, A. An Analysis of Visual Faces Datasets. In Proc. 1st International Conference "Interactive Collaborative Robotics" ICR-2016, Budapest, Hungary, Springer LNCS, Vol. 9812, 2016. pp. 18-26.
12. Saveliev, A., Saitov, S., Vatamaniuk, I., Basov, O., Shilov, N. Neural Network System for Monitoring State of an Optical Telecommunication System. In Proc. International Conference on Next Generation Wired/Wireless Networking NEW2AN-2016. Springer LNCS, Vol. 9870, 2016. pp. 39-49.
13. Ronzhin, Al., Vatamaniuk, I., Zelezny, M. Implementation of Face Recognition Methods as the First Step for Human Behaviour Analysis in Intelligent Room. In Proc. 24th International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision WSCG-2016 (poster proc.), Pilsen, Czech Republic, CSRN 2603, 2016. pp. 61-64.

Papers published in Russian journals and editions, indexed by RCSI

14. Kipyatkova, I., Karpov, A. Variants of Deep Artificial Neural Networks for Speech Recognition Systems // SPIIRAS Proceedings, Vol. 6(49), 2016. pp. 80-103. (VAK; RSCI impact factor – 0,359).
15. Ivanko, D., Karpov, A. An Analysis of Perspectives for Using High-Speed Cameras in Processing Dynamic Video Information // SPIIRAS Proceedings, Vol. 1(44), 2016. pp. 98-113. (VAK; RSCI impact factor – 0,359).
16. Karpov, A., Kaya, H., Salah, A. State-of-the-art Tasks and Achievements of Paralinguistic Speech Analysis Systems // Scientific and Technical Journal of Information Technologies, Mechanics and Optics, Vol. 16, No. 4, 2016. pp. 581–592. (VAK; RSCI impact factor – 0,285).
17. Ivanko, D., Kipyatkova, I., Ronzhin, A., Karpov, A. Analysis of Multimodal Fusion Techniques for Audio-Visual Speech Recognition // Scientific and Technical Journal of Information Technologies, Mechanics and Optics, Vol. 16, No. 3, 2016. pp. 387-401. (VAK; RSCI impact factor – 0,285).

18. Saveliev, A. Algorithms of Data Processing in Supervised Accounts of a Videoconferencing System // Information and Control Systems, No. 3(82), 2016. pp. 906–913. (VAK; RSCI impact factor – 0,502).
19. Basov, O., Kipyatkova, I., Saveliev, A., Saitov, I. Polymodal Information Encoding Models // Information and Control Systems, No. 2(81), 2016. pp. 68-73. (VAK; RSCI impact factor – 0,502).
20. Levonevskiy, D., Vatamaniuk, I., Saveliev, A., Denisov, A. Corporate Information System of User Service as a Component of Cyber-Physical Intellectual Space // Journal of Instrument Engineering. Vol. 59, No. 11, 2016. pp. 15–23. (VAK; RSCI impact factor – 0,282).
21. Struev, D., Bondareva, N., Budkov, V., Basov, O., Ronzhin, A. A conceptual model multimodal user interface of the subscriber terminal // Scientific News of the Belgorod State University. Series: Economics. Informatics. No. 23 (244), Issue 40, 2016. pp. 156-164. (VAK; RSCI impact factor – 0,261).
22. Kipyatkova, I. Automatic recognition of continuous Russian speech using acoustic models based on deep neural networks. In Proc. 9th Conference "Information Technologies in Control" ITC-2016, St. Petersburg, 2016. pp. 807-814.
23. Ryumin, D., Karpov, A. Automated hand gesture recognition system using the Kinect sensor // In Proc. 9th Conference "Information Technologies in Control" ITC-2016, St. Petersburg, 2016. pp. 838-846.
24. Ivanko, D., Karpov, A. The use of high-speed video camera in the problems of human-computer interaction // In Proc. 9th Conference "Information Technologies in Control" ITC-2016, St. Petersburg, 2016. pp. 801-806.
25. Karpov, A., Kryuchkov, B., Ronzhin, A., Usov, V. Designing human-robot interaction in a united team of cosmonauts and autonomous mobile robots on the lunar surface. In Proc. 26th International Conference “Extreme Robotics (ER-2016)”, St. Petersburg, 2016. pp. 76-80.
26. Savelyev, A., Somenkov, N. Architecture of client-side application of peering videoconferencing // In Proc. XXIX International Scientific Conference "Mathematical Methods in Engineering and Technology" (MMTT-29), St. Petersburg, 2016. pp. 176-180.
27. Verkhodanova, V., Shapranov, V., Karpov, A. Filled pauses and lengthenings detection using machine learning techniques. In Proc.

7th Workshop on Experimental Linguistics ExLing-2016, St. Petersburg, Russia, 2016. pp. 167-170.
28. Malakhov, S., Karpov, A., Sirkin, L., Usov, V. The approaches to compensation of defects of polymodal perception at persons with deep visual impairment by means of high information and communication technologies. In Proc. 7th International Conference on Cognitive Science, Svetlogorsk, Russia, 2016. pp. 406-407.

Other Publications

29. Kryuchkov, B., Usov, V., Karpov, A. An ontological approach to designing interactive virtual environments for a visual representation of planned actions during dialogue controlling a robot-assistant onboard of the ISS. In Proc. VI International Conference "Open Semantic Technologies for Intelligent Systems" OSTIS-2016, Minsk, Belarus, 2016. pp. 477-482.
30. Karpov, A. Multimodal recognition of Russian speech using audio and video information. Scientific works of the participants of the competition "Young scientists of the University ITMO", St. Petersburg, 2016. pp. 132-138.
31. Karpov, A., Kryuchkov, B., Ronzhin, A., Usov, V. Designing human-robot interaction in a united team of cosmonauts and autonomous mobile robots on the lunar surface. In Proc. 26th International Conference "Extreme Robotics (ER-2016)", St. Petersburg, Russia, 2016. pp. 71-75.

Tutorial book

32. Tampel, I., Karpov, A. Automatic Speech Recognition: tutorial book – St. Petersburg, ITMO University, 2016. 138 p.

Laboratory of Computer Security Problems

Head of Laboratory: PhD Dr.Tech. Sci. Prof. 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 – 16 research fellows and 6 PhD 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;

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, intellectual decision support systems, processing of incomplete and contradictory information;

Telecommunications, including decision making and planning for telecommunication systems, analysis and synthesis of protected multiservice networks;

Internet of things, smart cities;

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 PhD Dr.Tech. Sci. Prof. - 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

Senior Researcher PhD - Vasiliy A. Desnitsky – computer network security, anti-tamper techniques, security policies, object-oriented patterns, Java2 EE platform. desnitsky@comsec.spb.ru, http://comsec.spb.ru/desnitsky/

Senior Researer PhD - Evgenia S. Novikova – computer network security, cryptography, authentication, visualization of security information, programming. novikova@comsec.spb.ru, http://comsec.spb.ru/novikova/

Senior Researcher PhD - Andrey A. Chechulin – computer network security, intrusion detection, virus, security analysis, network worm protection, programming. chechulin@iias.spb.su, http://comsec.spb.ru/chechulin/

Researcher - Elena V. Doynikova – computer network security, information security risk analysis methods, risk management. doynikova@comsec.spb.ru, http://comsec.spb.ru/doynikova/

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

Junior Research PhD student - Andrey V. Fedorchenko – computer network security, methods of correlation of security events, vulnerability analysis of computer networks. fedorchenko@comsec.spb.ru, http://comsec.spb.ru/fedorchenko/

Developer - Kolomeec Maxim Vadimovich – distributed system security, security visualisation. kolomeec@comsec.spb.ru, http://comsec.spb.ru/kolomeec/

Programmer - Dmitry S. Levshun – security of distributed systems, embedded devices, correlation of security events. levshun@comsec.spb.ru, http://comsec.spb.ru/levshun/

Developer - Bulgakov V. Mikhail – network security, embedded devices. bulgakov@comsec.spb.ru http://comsec.spb.ru/bulgakov/

Developer Kushnerevich G. Alexei – big data, data analysis. kushnerevich@comsec.spb.ru, http://comsec.spb.ru/kushnerevich/

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

PhD student - Merkushev Eugene Sergeevich – security in cloud computing. merkushev@comsec.spb.ru, http://comsec.spb.ru/merkushev/

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

PhD student - Styrov Kirill Glebovich – computer network security, intrusion detection systems, big data. styrov@comsec.spb.ru, http://comsec.spb.ru/styrov/

Grants and projects

Igor 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 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.

Igor Kotenko (Principal Investigator) – State Contract No. 14.604.21.0137 "Development of the technologies of the interactive visualization of the unformalized heterogeneous data for decision support systems in scope of the information security monitoring and management in the information and telecommunication systems". Project of the Russian Ministry of Education and Science in scope of the Program "Research and development in priority directions of evolution of the scientific and technological complex of Russia for 2014-2020", 2014-2016.

Igor Kotenko (Principal Investigator) – State Contract No. 14.604.21.0147 "Development of the methods for aggregation, normalization, analysis and visualization of big arrays of the heterogeneous, structured, semi-structured and unstructured data for the security monitoring and management of the distributed network of the electronic consumer devices". Project of Russian Ministry of Education and Science in scope of the Program "Research and development in priority directions of evolution of the scientific and technological complex of Russia for 2014-2020", 2014-2016.

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

Andrey Chechulin (Principal Investigator) - "Investigation and development of data mining techniques for warehouses that contain multiple fact tables". Research Grant No.16-37-50067 of the Russian Foundation for Basic Research, 2016-2016.

Andrey Chechulin (Principal Investigator) - "Development of mathematical 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.

Vasiliy Desnitsky (Principal Investigator) - "Development and investigation of models and techniques for design and verification of combined protection mechanisms for information and telecommunication systems with embedded devices on the base of expert knowledge". Research Grant No. 14-07-00417-a of the Russian Foundation for Basic Research, 2014-2016.

Igor Saenko (Principal Investigator) - "Models and methods of access to resources in a unified information and communication space of heterogeneous systems based on artificial intelligence technology". Research Grant No. 14-07-00697-a of the Russian Foundation for Basic Research, 2014-2016.

Conferences

24th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2016). Heraklion, Crete, Greece, February 17-19, 2016 (V. Desnitsky, two sectional talks).

18th Conference «RusCrypto» on Cryptology, Steganography, Digital Signature and Security Systems, Solnechnogorsk, Russia, March 22-25, 2016. (A. Fedorchenko, A. Chechulin, V. Desnitsky, four sectional talks).

International Forum on practical security Positive Hack Days, Moscow, May 26-27, 2016. (I. Kotenko, A. Fedorchenko, A. Chechulin, V. Desnitsky, E. Doynikova, A. Branitsky, M. Kolomeec, D. Levshun, M. Bulgakov, two sectional talks).

XIX International Conference on Soft Computing and Measurements (SCM 2016), St. Petersburg, Russia, May 25-27, 2016 (V. Desnitsky, D. Levshun, two sectional talks).

XXIX International Scientific Conference "Mathematical Methods in Engineering and Technology - MMET-29", St. Petersburg State Technological Institute, St. Petersburg, Russia, May 31 – June 3, 2016. (I. Saenko, sectional talk).

25th All-Russian Conference “Methods and Technical Tools of Information Security” (MTTIS 2016), St. Petersburg, Russia, July 4 - 7, 2016. (I. Saenko, sectional talk).

13th International Symposium on Neural Networks (ISNN 2016). St. Petersburg. July 6-8, 2016. (I. Saenko, sectional talk).

International Symposium on Mobile Internet Security (MobiSec’16). Taichung, Taiwan. July 14-15, 2016. (E. Doynikova, two sectional talks).

13th IEEE Conference on Advanced and Trusted Computing (ATC 2016). Toulouse, France. July 18-21, 2016. (I. Kotenko, invited talk).

16th IEEE International Conference on Scalable Computing and Communications (ScaleCom 2016). Toulouse, France. July 18-21, 2016. (I. Kotenko, sectional talk).

1st International Workshop on Artificial Intelligence for Privacy and Security (PrAISe 2016). Hague, Netherlands. August 29-30, 2016. (I. Kotenko, sectional talk).

International Cross Domain Conference and Workshops (CD-ARES 2016). Salzburg, Austria. August 31 – September 2, 2016. (A. Chechulin, sectional talk).

International Congress on Intellectual Systems and Information Technologies (IS&IT 2016), Divnomorskoye, Russia, September 2-9, 2016 (I. Kotenko, A. Chechulin, E. Doynikova, three sectional talks).

10th International Symposium on Intelligent Distributed Computing (IDC 2016). Paris, France. October 10-12, 2016. (I. Kotenko, two sectional talks).

15th National Conference on Artificial Intelligence with International Participation (CAI 2016). Smolensk, Russia. October 3 - 7, 2016. (A. Chechulin, two sectional talks).

Conference on Information Technologies in Control (ITC) held in conjunction with the 9-th Russian Multiconference on Problems in Control (RMPC). St. Petersburg, Russia. October 4 - 6, 2016. (I. Kotenko, I. Saenko, A. Chechulin, A. Fedorchenko, A. Branitsky, A. Pronoza, twelve sectional talks).

International Congress on Computer Science: Information Systems and Technologies (CSIST-2016). Minsk, Republic of Belarus, October 24 – 27, 2016. (I. Saenko, invited talk).

XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg (Russia), October 26-28, 2016. (I. Kotenko, I. Saenko, A. Chechulin, A. Fedorchenko, A. Branitsky, M. Kolomeec, D. Levshun, M. Bulgakov, A. Kushnerevich – nineteen sectional talks).

International Scientific School "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems" (IM&CTCPA 2016), St. Petersburg, October 31 – November 2, 2016. (I. Kotenko, V. Desnitsky, E. Doynikova, A. Chechulin, M. Kolomeec – five invited talks).

Scientific-organizational activity

Special session "Security in parallel, distributed and network-based systems" (SPDNS 2016). PDP 2016. Heraklion, Crete, Greece, February 17-19, 2016. http://www.comsec.spb.ru/spdns16/. I. Kotenko is the organizer and Chairman of the Program Committee. 26 participants.

The section "Perspective research in the field of cybersecurity" at the International Conference “RusCrypto 2016”. Solnechnogorsk, Russia. March 22-25, 2016. http://www.ruscrypto.ru/accotiation/archive/rc2016/. I. Kotenko is the the section organizer and moderator. 20 participants.

International Symposium on Mobile Internet Security (MobiSec 16). Taichung, Taiwan. July 14-15, 2016. http://isyou.info/conf/mobisec16/. I. Kotenko – Chairman of the Program Committee responsible for the articles’ publication. 50 participants.

International Scientific School "Incident management and countering targeted cyber-physical attacks in distributed large-scale critical systems" (IM&CTCPA 2016), St. Petersburg, October 31 – November 2, 2016. http://www.comsec.spb.ru/imctcpa16/ I. Kotenko – the organizer and Chairman of the School, I. Saenko, A. Chechulin, V. Desnitsky – members of the Organizing Committee. 50 participants.

International Cooperation

I. Kotenko – participation in Program Committees of 32 International conferences, workshops and scientific schools.

I. Saenko – participation in Program Committees of 4 International conferences, workshops and scientific schools.

V. Desnitsky – participation in Program Committees of 3 International conferences, workshops and scientific schools.

A. Chechulin – participation in Program Committees of 4 International conferences, workshops and scientific schools.

E. Novikova – participation in Program Committees of 2 International conferences, workshops and scientific schools.

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), etc.

Membership in International Societies, Editorial Boards

I. Kotenko – Member of Russian and European Associations of Artificial Intelligence, IEEE и 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”, “The FTRA Journal of Convergence” and “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.

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.

Intellectual property

Programs and databases

E. Doynikova, I. Kotenko. Component for information security risks evaluation for network assets based on security events analysis. Certificate No. 201614489. Registered in the Computer Program Registry 25.04.2016.

I. Saenko, I. Kotenko, V. Avramenko, D. Bobreshov-Shishov. Software for information security evaluation on the basis of expert assessment of unauthorized access threats in automated systems. Certificate No. 2016614489. Registered in the Computer Program Registry 25.04.2016.

I. Saenko, A. Chechulin, S. Ageev, A. Bogdanov. Software for adaptive network traffic analysis for the information security risks evaluation. Certificate No. 2016614488. Registered in the Computer Program Registry 25.04.2016.

I. Saenko, A. Chechulin, I. Kotenko, F. Skorik. Software for operational classification of data about the network status based on using of artificial neural networks. Certificate No. 2016614485. Registered in the Computer Program Registry 25.04.2016.

M. Kolomeets, A. Chechulin, I. Kotenko. Component for network security metrics visualization using matrices. Certificate No. 2016614487. Registered in the Computer Program Registry 25.04.2016.

M. Kolomeets, A. Chechulin. Component for network topology visualization using graphs. Certificate No. 2016614486. Registered in the Computer Program Registry 25.04.2016.

D. Levshun, A. Chechulin, I. Kotenko. System for support and management of database of the room access control and management system based on the contactless smart cards. Federal Service for Intellectual Property. Certificate No. 2016612543. Registered in the Computer Program Registry 01.03.2016.

I. Kotenko, M. Kolomeets, A. Chechulin. Component for creation of patterns and retrieval of information objects and relationships between them for visualization of unformalized data with heterogeneous structure. Certificate No. 2016663182. Registered in the Computer Program Registry 29.11.2016.

D. Levshun, A. Chechulin. Database of the logging server of a secure access control system for Smart House model. Federal Service for Intellectual Property. Certificate No. 2016621608. Registered in the Database Registry 29.11.2016.

I. Saenko, A. Kushnerevich, I. Kotenko. Big data aggregation component for computer network security monitoring. Federal Service for Intellectual Property. Certificate No. 2016663498. Registered in the Computer Program Registry 08.12.2016.

I. Kotenko, I. Saenko, A. Kushnerevich, A. Chechulin. Big data analysis component for computer network security monitoring. Federal Service for Intellectual Property. Certificate No. 2016663929. Registered in the Computer Program Registry 19.12.2016.

I. Saenko, A. Kushnerevich, A. Branitskiy. Big data normalization component for computer network security monitoring. Federal Service for Intellectual Property. Certificate No. 2016663554. Registered in the Computer Program Registry 12.12.2016.

I. Saenko, A. Kushnerevich, V. Desnitsky. User interaction component of Big data processing system for computer network security monitoring. Federal Service for Intellectual Property. Certificate No. 2016663475. Registered in the Computer Program Registry 08.12.2016.

M. Kolomeec, A. Chechulin, I. Kotenko. Component for extraction of information objects and their links based on patterns of normalization and reduction of dimension of information objects, formation of a multidimensional matrix of links between information objects. Federal Service for Intellectual Property. Certificate No. 2016663963. Registered in the Computer Program Registry 20.12.2016.

M. Kolomeec, A. Chechulin. API component for providing access from external information systems to the results of visualization. Federal Service for Intellectual Property. Certificate No. 2016663709. Registered in the Computer Program Registry 14.12.2016.

A. Fedorchenko, A. Chechulin. Component for the expert evaluation of the quality of formalized heterogeneous structure data visualization. Federal Service for Intellectual Property. Certificate No. 2016663861. Registered in the Computer Program Registry 19.12.2016.

D. Levshun, A. Chechulin, I. Kotenko. Component for the implementation of the network layer interaction of microcontrollers based on I2C protocol. Federal Service for Intellectual Property. Certificate No. 2016663951. Registered in the Computer Program Registry 20.12.2016.

M. Bulgakov, A. Chechulin, I. Kotenko. DCC protocol analyzing component for the model of Russian Railway as a security incident management object. Federal Service for Intellectual Property. Certificate No.

2016663840. Registered in the Computer Program Registry 19.12.2016.

E. Doynikova, I. Kotenko. Component of the dynamic countermeasure selection on the basis of the security incidents analysis for the attack propagation prevention in the computer network. Federal Service for Intellectual Property. Certificate No. 2016663492. Registered in the Computer Program Registry 08.12.2016.

A. Branitskiy, I. Kotenko. Component of classification of anomalous network connections based on artificial immune systems. Federal Service for Intellectual Property. Certificate No. 2016663476. Registered in the Computer Program Registry 08.12.2016.

E. Doynikova. Component for the efficiency evaluation of the security assessment system in computer networks Federal Service for Intellectual Property. Certificate No. 2016663928. Registered in the Computer Program Registry 19.12.2016.

V. Desnitsky. Component for detection of anomalous data from sensors for a system of temperature mode regulation in a room. Federal Service for Intellectual Property. Certificate No. 2016663374. Registered in the Computer Program Registry 06.12.2016.

V. Desnitsky, I. Kotenko. Component for evaluation of effectiveness of information flow verification on the base of model checking method. Federal Service for Intellectual Property. Certificate No. 2016663477. Registered in the Computer Program Registry 08.12.2016.

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.

Recent Results

1. Methods, models, techniques and algorithms for the collection, preprocessing and correlation of security information and events on the basis of complex distributed intelligent sensors and big data [12, 13, 21, 25, 26, 35, 41, 51, 52, 58, 69, 85, 93, 110].

2. Methods, models, techniques and algorithms of trusted data bus functioning and a hybrid storage of information and security events [13, 25, 26, 62].
3. Methods, models, techniques and algorithms to detect in real time complex multistage targeted attacks on the base of intelligent data analysis and security events [8, 9, 19, 20, 23, 35, 50, 53, 66, 83, 86, 92].
4. Methods, models, techniques and algorithms for calculating primary and integrated security metrics, analysis of security events history, prediction of malefactor actions and their consequences [1, 5, 33, 42, 65, 71].
5. Methods, models, techniques, algorithms, architecture and software prototypes of the components for the automated responding against targeted information/software/physical attacks on the basis of expert knowledge, logical reasoning and the hybrid repository of information and security events [4, 5, 34, 76].
6. Models of specific application areas (smart house, railways, power and water supply system, mobile communication network for critical situation management) as objects of security incident management [2, 13, 16, 21, 22, 28, 38, 45, 70, 77, 94, 101].
7. Models, techniques, algorithms and software prototype of computer network security assessment and selection of security means on the base of attack graphs and graphs of service dependencies [1, 5, 30, 67, 71, 82, 88, 104].
8. Models, techniques and software prototypes of events and security information collection and aggregation mechanisms to protect information in mission-critical infrastructures, using techniques and methods of parallel computing [8,12, 44, 49, 72, 79, 91].
9. Mathematical methods and algorithms of normalization and analysis of large volumes of heterogeneous structured, semi-structured and unstructured data coming from synchronous and asynchronous distributed network sources [8, 12, 49, 72, 108].
10. Models and techniques of preliminary design and reconfiguration of access control schemes for computer network information and communication resources on the base of genetic optimization algorithms, models, techniques and algorithms for integration and functioning of components of access control system for diverse information and communication resources of the entire information and communication space [10, 17, 48, 54, 55, 56, 57, 63, 73, 74, 78, 87, 98].
11. A technique of hierarchical combining (hierarchical hybridization) of binary classifiers based on computational intelligence techniques to identify anomalous network connections, a model and an algorithm

of functioning of evolution immune system for detection and classification of network attacks, an architecture and software prototypes of distributed network attack detection system on the base of combination of signature analysis and computational intelligence methods [6, 19, 23, 32, 36, 37, 80, 99].

12. Models, techniques, algorithms, architecture and software prototypes for interactive visualization of non-formalized heterogeneous data for decision support systems in security monitoring and information management of telecommunication systems [3, 11, 18, 24, 27, 29, 43, 47, 64, 68, 75, 84, 89, 96, 97, 100, 105].
13. Models, techniques, algorithms, architecture and software prototypes of web site classification tools on the base of data mining methods [7, 31, 46, 107].
14. A model and technique to identify anomalous data from sensors and information streams verification in the information and telecommunication systems with embedded devices on the base of restrictions and rules of the target system functioning [2, 4, 14, 16, 22, 39, 40, 59, 60, 81, 90, 102, 103].

Awards and research grants

Saenko, I. B., Kotenko, I. V. – the Best Paper Award bestowed at the International Symposium of Mobile Internet Security (MobiSec 2016). Taichung, Taiwan. July 14-15, 2016.

Desnitsky, V. A., E. Novikova, E. S. - Winners of the 2016 contest for subsidy's provisions to young scientists, young candidates of sciences at higher schools and academic institutions located in St. Petersburg.

Doynikova, E. V. - Finalist of the "Youth Prize of St. Petersburg" in the nomination of science and technology in 2016. Awarded a diploma of the St. Petersburg Public Chamber.

Bulgakov,M. V. - Winner of the annual competition of scientific achievements of students and graduate students of ETU "LETI" in the University scientific and educational areas of 2016.

Levshun, D. C. - Winner of the creative projects' contest of ETU "LETI" students in the field of science, technology and innovations in 2016.

Levshun, D. C. - Winner of the annual competition of scientific achievements of students and graduate students of ETU "LETI" in the University scientific and educational areas of 2016.

D. Levshun and A. Chechulin – the Best paper award bestowed at LXIII International Theoretical and Practical Conference "Innovations in Science", Novosibirsk, Russia.

References

Papers published in journals indexed in WoS, Scopus

1. Igor Kotenko, Elena Doynikova. Dynamical calculation of security metrics for countermeasure selection in computer networks // Proceedings of the 24th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2016). Heraklion, Crete, Greece, Feb. 17-19, 2016. Los Alamitos, California. IEEE Computer Society. 2016. DOI 10.1109/PDP.2016.96. pp.558-565. (WoS and Scopus)
2. Vasily Desnitsky, Andrey Chechulin, Igor Kotenko, Dmitry Levshun, and Maxim Kolomeec. Application of a technique for secure embedded device design based on combining security components for creation of a perimeter protection system // Proceedings of the 24th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP 2016). Heraklion, Crete, Greece, Feb. 17-19, 2016. Los Alamitos, California. IEEE Computer Society. 2016. DOI 10.1109/PDP.2016.99. pp. 609-616. (WoS and Scopus)
3. Maxim Kolomeec, Andrey Chechulin, Anton Pronoza and Igor Kotenko. Technique of Data Visualization: Example of Network Topology Display for Security Monitoring // Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), Vol. 7, No. 1, March 2016. pp. 58-78. (Scopus)
4. Vasily Desnitsky and Igor Kotenko. Automated design, verification and testing of Secure Systems with Embedded Devices // Journal of Ambient Intelligence and Humanized Computing (AHIC), Springer. October 2016, Volume 7, Issue 5, pp.705–719. DOI 10.1007/s12652-016-0371-6. http://link.springer.com/article/10.1007/s12652-016-0371-6 (WoS and Scopus)
5. Elena Doynikova, Igor Kotenko, Dmitry Komashinsky. Countermeasure selection based on the attack and service dependency graphs for security incident management // 10th International Conference on Risks and Security of Internet and Systems: CRiSIS 2015. July 20-22, 2016. Mytilene, Lesvos Island, Greece / C. Lambrinoudakis and A. Gabillon (Eds.). Lecture Notes in Computer Science (LNCS), Vol. 9572, Springer, 2016. pp.107–124. DOI: 10.1007/978-3-319-31811-0_7. http://link.springer.com/chapter/10.1007/978-3-319-31811-0_7 (WoS and Scopus)
6. Alexander Branitskiy, Igor Kotenko. Hybridization of computational intelligence methods for attack detection in computer networks // Journal of Computational Science, Elsevier, 2016. (WoS and Scopus). Available online - 1 August 2016. http://www.sciencedirect.com/science/journal/aip/18777503 (WoS and Scopus)

7. Igor Kotenko, Andrey Chechulin. Categorization of web pages for protection against inappropriate content in the Internet // International Journal of Internet Protocol Technology (JIPT), 2016. (Scopus) http://www.inderscience.com/info/ingeneral/forthcoming.php?jcode=ijipt (WoS and Scopus)
8. Igor Saenko, Fadey Skorik, Igor Kotenko. Application of Hybrid Neural Networks for Monitoring and Forecasting Computer Networks States // 13th International Symposium on Neural Networks (ISNN 2016). St. Petersburg. July 6-8, 2016. LNCS, Vol.9719, 2016, pp. 521–530, DOI: 10.1007/978-3-319-40663-3_60 (WoS and Scopus)
9. Igor Saenko, Sergey Ageev and Igor Kotenko. Detection of traffic anomalies in multi-service networks based on a fuzzy logical inference // Intelligent Distributed Computing X. Studies in Computational Intelligence. Springer-Verlag, Vol.678. Proceedings of 10th International Symposium on Intelligent Distributed Computing - IDC'2016. Paris, France. October 10-12, 2016. Springer-Verlag. 2017. pp. 79-88. (WoS and Scopus)
10. Igor Saenko and Igor Kotenko. Reconfiguration of RBAC schemes by genetic algorithms // Intelligent Distributed Computing X. Studies in Computational Intelligence. Springer-Verlag, Vol.678. Proceedings of 10th International Symposium on Intelligent Distributed Computing - IDC'2016. Paris, France. October 10-12, 2016. Springer-Verlag. 2017. pp.89-98. (WoS and Scopus)
11. Maxim Kolomeets, Andrey Chechulin and Igor Kotenko. Visualization Model for Monitoring of Computer Networks Security based on the Analogue of Voronoi Diagrams // International Cross Domain Conference and Workshops (CD-ARES 2016). August 31 – September 2, 2016. Salzburg, Austria. Lecture Notes in Computer Science (LNCS), Vol. 9817. Springer-Verlag. 2016, pp.141–157. DOI: 10.1007/978-3-319-45507-5_10. http://link.springer.com/chapter/10.1007%2F978-3-319-45507-5_10 (WoS and Scopus)
12. Igor Kotenko, Igor Saenko. An Approach to Aggregation of Security Events in Internet-of-Things Networks Based on Genetic Optimization // The 16th IEEE International Conference on Scalable Computing and Communications (ScaleCom 2016). Toulouse, France. July 18-21, 2016. pp. 657-664. (WoS and Scopus).
13. Igor Kotenko, Dmitry Levshun, Andrey Chechulin. Event correlation in the integrated cyber-physical security system // XIX International Conference on Soft Computing and Measurements (SCM'2016). IEEE Xplore, 2016. pp. 484-486. DOI: 10.1109/SCM.2016.7519820. (WoS and Scopus)

14. Vasily Desnitsky, Igor Kotenko. Event analysis for security incident management on a perimeter access control system // XIX International Conference on Soft Computing and Measurements (SCM'2016). IEEE Xplore, 2016. pp.481-483. DOI: 10.1109/SCM.2016.7519819. (WoS and Scopus)
15. Igor Kotenko. Guest Editorial: Security in Parallel, Distributed and Network-Based Computing // Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), Vol. 7, No. 2, June, 2016. pp.1-2. (Scopus)
16. Vasily Desnitsky, Dmitry Levshun, Andrey Chechulin, Igor Kotenko. Design technique for secure embedded devices: application for creation of integrated cyber-physical security system // Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), Vol. 7, No. 2, June, 2016. pp. 60-80. http://isyou.info/jowua/papers/jowua-v7n2-4.pdf (Scopus)
17. Igor Saenko and Igor Kotenko. Using Genetic Algorithms for Design and Reconfiguration of RBAC Schemes // 1st International Workshop on Artificial Intelligence for Privacy and Security. PrAISe '16, August 29-30, 2016, The Hague, Netherlands. ACM. 2016. 8 p. ISBN 978-1-4503-4304-6/16/08. DOI: http://dx.doi.org/10.1145/2970030.2970033. (WoS and Scopus)
18. Maxim Kolomeec, Andrey Chechulin, Igor Kotenko. Technique for network topology visualization for security monitoring. Proceedings of the universities. Instrument making. Vol.59, No. 10, 2016. pp.807-812. DOI: 10.17586/0021-3454-2016-59-10-173-178. (RISC, Scopus)
19. Igor Saenko, Fadey Skorik and Igor Kotenko. Monitoring and forecasting of computer networks states based on hybrid neural networks. Proceedings of the universities. Instrument making. Vol.59, No. 10, 2016. pp. 795-800. (RISC, Scopus)
20. Igor Saenko, Oleg Lauta and Igor Kotenko. Using stochastic network conversion technique for modeling of mobile banking attacks. Proceedings of the universities. Instrument making. Vol.59, No. 11, 2016. pp. 928-933. (RISC, Scopus)

Papers published in national journals indexed in the RISC

21. Igor Kotenko, Dmitry Levshun, Andrey Chechulin, Sergey Bushuev. Event correlation in the integrated cyber-physical security system. Proceedings of the XIX International Conference on Soft Computing and Measurements (SCM'2016), Vol. 2, St. Petersburg, ETU "LETI", 2016. pp. 327-331.
22. Vasily Desnitsky, Igor Kotenko, Yan Kopchak. Analysis of events for management of security incidents on the example of access control system. Proceedings of the XIX International Conference on

Soft Computing and Measurements (SCM'2016), Vol. 2, St. Petersburg, ETU "LETI", 2016. pp.332-336.
23. Alexander Branitskiy, Igor Kotenko. Analysis and Classification of Methods for Network Attack Detection. SPIIRAS Proceedings. 2016. Vol. 2(45). pp. 207-244. .
24. Anton Pronoza, Andrey Chechulin, Igor Kotenko. Mathematical Models of Visualization in SIEM Systems. SPIIRAS Proceedings. 2016. Vol 3(46). pp. 90-107. DOI: http://dx.doi.org/10.15622/s pp.46
25. Andrey Fedorchenko, Dmitry Levshun, Andrey Chechulin, Igor Kotenko. An Analysis of Security Event Correlation Techniques in Siem-Systems. Part 1. SPIIRAS Proceedings. 2016. Vol. 4(47). pp. 5-27.
26. Andrey Fedorchenko, Dmitry Levshun, Andrey Chechulin, Igor Kotenko. An Analysis of Security Event Correlation Techniques in Siem-Systems. Part 2 SPIIRAS Proceedings. 2016. Vol. 4(47). pp.208-225. DOI: 10.15622/sp.49.11
27. Evgenia Novikova, Igor Kotenko. Detection of the abnormal activity in the mobile money transfer services using RADViz-visualization. SPIIRAS Proceedings. 2016. Vol. 5(48). pp. 32-51.
28. Vasily Desnitsky, Andrey Chechulin, Igor Kotenko, Dmitry Levshun, Maxim Kolomeec. Combined Design Technique for Secure Embedded Devices Exemplified by a Perimeter Protection System. SPIIRAS Proceedings. 2016. Vol. 5(48). pp. 5-31.
29. Evgenia Novikova, Igor Kotenko, Eugene Fedotov. Visual data analysis for the anomaly detection in mobile money transfer services. Information Security. Inside, 2016, No. 4. pp. 40-47; 2016, No. 5. pp.72-82.
30. Elena Doynikova, Igor Kotenko. Techniques and Tool for the Risk Assessment on the base of the Attack Graphs in Security Information and Event Management Systems. Information and Control Systems, 2016, No. 5. pp.54-65. ISSN 1684-8853.2016.
31. Dmitry Novozhilov, Andrey Chechulin. Improving of web-sites categorization on the basis of analysis of HTML-tags statistics for the blocking of inappropriate content. Information and Control Systems, No. 6, 2016. pp.65-73.
32. Alexander Branitskiy, Igor Kotenko. Techniques of combining the binary classifiers for identifying the anomalous network connections. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 660-664.
33. Elena Doynikova, Igor Kotenko. Technique for the security assessment of computer networks on the base of attack graphs and service dependency graphs. Conference on Information Technologies

in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.694-699.
34. Elena Doynikova, Igor Kotenko. Technique for countermeasure selection to response on security incidents in computer networks on the base of security metrics. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St.Petersburg, Russia. October 4–6, 2016. pp.700-705.
35. Nikolay Vasilishin, Igor Ushakov, Igor Kotenko. Research of the network traffic analysis algorithms using big data to detect computer attacks. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.670-675.
36. Alexander Branitskiy. Architecture of the distributed system of detection, classification and prevention of network attacks based on signature analysis and computational intelligence methods. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 651-655.
37. Alexander Branitskiy. Modified model of computational immune system based on evolutionary-genetic approach for detection and classification of anomalous network connections. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 656-659.
38. Mikhail Bulgakov, Dmitry Levshun. The main challenges of the protection of physical security systems communication lines. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.665-669.
39. Vasily Desnitsky. Detection of anomalous data from sensors embedded devices based on expert knowledge. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.676-679.
40. Vasily Desnitsky. Implementation of software means for model checking based verification of network data flows. Conference on Infor-

mation Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.680-683.
41. Evgenia Deshevih, Igor Ushakov, Andrey Chechulin. Integration of SIEM systems with security event correlation systems based on Big Data technology. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.684-687.
42. Elena Doynikova. Complex of the security metrics for security assessment of computer networks on the base of attack graphs and service dependency graphs. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.688-693.
43. Maxim Kolomeec. Usage of human's cognitive features for security data visualization. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (MPC). Proceedings. St. Petersburg, Russia. October 4-6, 2016. pp.723-728.
44. Aleksey Kushnerevich. Aggregation of big data arrays for detection of security events on the basis of distributed stream processing. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 729-734.
45. Dmitry Levshun. The integration technique of access control system into integrated security system. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.735-739.
46. Dmitry Novozhilov, Andrey Chechulin. Development of the platform for experiments with the websites classification methods. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.740-749.
47. Anton Pronoza, Andrey Chechulin, Ian Kopchak. Approach for network security visualization evaluation based on ratio of informativity and ease of perception. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.750-757.

48. Igor Saenko and Mikhail Biryukov. Method of integration of local access control schemes for heterogeneous resources of a common information space. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 729-734.
49. Igor Saenko, Aleksey Kushnerevich, and Sergey Bushuyev. Application of the distributed parallel computing framework for preliminary processing of big data on security events in the Internet of things. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 763-767.
50. Igor Saenko and Oleg Lauta. Assessment of cyber-stability of computer networks on the basis of results of stochastic simulation of the computer attacks. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp. 768-773.
51. Andrey Fedorchenko. Analysis of security events correlation features in SIEM-systems. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St.Petersburg, Russia. October 4–6, 2016. pp.774-777.
52. Andrey Fedorchenko. Features of security events correlation technique for target attacks detection. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St.Petersburg, Russia. October 4–6, 2016. pp.778-781.
53. Andrey Chechulin. Techniques for attack models building and modification for network security analysis. Conference on Information Technologies in Control (ITC) held in conjunction with 9-th Russian Multiconference on Problems in Control (RMPC). Proceedings. St. Petersburg, Russia. October 4–6, 2016. pp.782-785.
54. Igor Saenko, Aleksey Brunilin, Vyacheslav Efimov and Sergey Yasinskiy. Organization of information exchange of heterogeneous automated systems: ontological approach. Information and Space. Scientific and technical journal, No. 2, 2016, pp. 60-64.
55. Andrey Kiy, Igor Saenko, and Sergey Bushuyev. Approach to access control of information resources based on the user application analysis. Technical sciences – from theory to practice. 2016, No. 3(51), Novosibirsk, SibAK. pp. 25-29.

56. Valery Kuvaev, Igor Saenko, and Sergey Bushuyev. Model of the assessment of operational accessibility to resources of the common information space. Technical sciences – from theory to practice. 2016, No. 3(51), Novosibirsk, SibAK. pp. 25-29.
57. Igor Saenko, Andrey Kiy, and Sergey Bushuyev. Method of access control to information resources on the basis of the analysis of activity of applications. Science today: facts, tendencies, forecasts [Text]: Proceedings, the International Scientific and Practical Conference, Vologda, June 22, 2016: in 2 parts. Part 1. Vologda, 2016. pp.69-71.
58. Nikita Dubrovin, Igor Ushakov, Andrey Chechulin. Application of Big Data Technology in Security Information and Event Management Systems // 5th International Conference on Advanced Infotelecommunication ("ICAIT-2016"). March 10-11, 2016. Collection of scientific papers. St. Petersburg, 2016. pp.348-353.
59. Vladislav Alexandrov, Vasily Desnitsky, Dmitry Chaly. Development and security analysis of a fragment of Internet of Things system. Modeling and Analysis of Information Systems. Volume 23, issue 26. 2016. pp. 767-776.
60. Vasily Desnitsky, Dmitry Chaly. The client-server based approach to protection of Internet of things software systems. Technical sciences – from theory to practice. 2016, No. 11 (59), Novosibirsk, SibAK. pp.6-13.
61. Dmitry Levshun, Andrey Chechulin. Mathematical model for description of information objects of different types to organize the search of materials in a single repository of multimedia data from the field ethnographic expeditions. LXIII International Theoretical and Practical Conference "Innovations in Science". November 30, 2016. Proceedings. Novosibirsk, 2016. pp.21-29. ISBN 2308-6009.
62. Mikhail Mikhailov, Maxim Kolomeec, Mikhail Bulgakov, Andrey Chechulin. Investigation and determination of general advantages and disadvantages of existing data warehouses types and analysis of applications. Technical sciences – from theory to practice: Proceedings of the 64th International Scientific and Practical Conference – Novosibirsk, SibAK, 2016. pp. 22-27.
63. Igor Saenko and Igor Kotenko. Genetic algorithms for Boolean matrix factorization in relation to access control problems in computer networks. 15th National Conference on Artificial Intelligence with International Participation (CAI 2016). October 3-7, 2016. Smolensk, Russia. Proceedings of the Conference. Vol.3, pp.98-106.
64. Maxim Kolomeec, Igor Kotenko, Andrey Chechulin. Visualization model for cybersecurity monitoring system based on analogue of

Voronoi diagrams. 15th National Conference on Artificial Intelligence with International Participation (CAI 2016). October 3-7, 2016. Smolensk, Russia. Proceedings of the Conference. pp.180-187.

Other publications

65. Elena Doynikova, Igor Kotenko. Security assessment based on attack graphs and open standards for computer networks with mobile components // The 2016 International Symposium on Mobile Internet Security (MobiSec'16). Taichung, Taiwan. July 14-15, 2016. 11 p.
66. Igor Saenko, Oleg Lauta, Igor Kotenko. Analytical modeling of mobile banking attacks based on a stochastic network conversion technique // The 2016 International Symposium on Mobile Internet Security (MobiSec'16). Taichung, Taiwan. July 14-15, 2016. 10 p.
67. Elena Doynikova, Igor Kotenko. Security Assessment Based on Attack Graphs and Open Standards for Computer Networks with Mobile Components // Research Briefs on Information & Communication Technology Evolution (ReBICTE), Vol. 2, 2016. 11 p. http://rbisyou.wixsite.com/rebicte/volume-2-2016.
68. Andrey Chechulin, Maxim Kolomeec. Application of new visualization techniques for security metrics of computer networks. 18th International Conference "RusCrypto" on Cryptology, Steganography, Digital Signature and Security Systems. Solnechnogorsk, Russia. March 22-25, 2016. http://www.ruscrypto.ru/
69. Andrey Fedorchenko, Igor Kotenko. Techniques of security events correlation for target attacks detecting. 18th Conference "RusCrypto" on Cryptology, Steganography, Digital Signature and Security Systems. Solnechnogorsk, Russia. March 22-25, 2016. http://www.ruscrypto.ru/
70. Vasily Desnitsky, Dmitry Levshun. The choice and combination of elements for the construction of an integrated system of cyber-physical security // 18th International Conference "RusCrypto" on Cryptology, Steganography, Digital Signature and Security Systems. Solnechnogorsk, Russia. March 22-25, 2016. http://www.ruscrypto.ru/
71. Sergey Ageev and Igor Saenko. Models of information security risk management in multiservice communication systems on the basis of fuzzy situation-dependent networks. 18th International Conference "RusCrypto" on Cryptology, Steganography, Digital Signature and Security Systems. Solnechnogorsk, Russia. March 22-25, 2016. http://www.ruscrypto.ru /
72. Igor Saenko, Aleksey Kushnerevich, Igor Kotenko, and Yan Kopchak. Program framework of the distributed parallel stream data

processing for security monitoring in Internet-of-things networks. Proceedings of the XXIX International scientific conference "Mathematical Methods in Technique and Technologies - MMTT-29", 31 May - 3 June, 2016, St. Petersburg State Institute of Technology, St. Petersburg, Russia, 2016, Vol.4, pp.90-94.
73. Igor Saenko and Valery Kuvayev. Models and technique of the assessment and support of operational accessibility of resources in the common information space. Proceedings of the XXIX International scientific conference "Mathematical Methods in Technique and Technologies - MMTT-29", May 31- June 3, 2016, St. Petersburg State Institute of Technology, St. Petersburg, Russia, 2016, Vol.6, pp. 139–142.
74. Aleksey Brunilin, Mikhail Biryukov, and Igor Saenko. Model and method of use of ontologies for access control management in the common information space. Proceedings of the XXIX International scientific conference "Mathematical Methods in Technique and Technologies - MMTT-29", May 31- June 3, 2016, St. Petersburg State Institute of Technology, St. Petersburg, Russia, 2016, Vol.6, pp.122–125.
75. Andrey Chechulin, Maxim Kolomeec, Igor Kotenko, Sergey Busuev. Architecture of software prototype of heterogeneous data visualization system. Proceedings of the XXIX International scientific conference "Mathematical Methods in Technique and Technologies - MMTT-29", May 31- June 3, 2016, St. Petersburg State Institute of Technology, St. Petersburg, Russia, Vol.8, 2016, pp.142-144.
76. Elena Doynikova, Andrey Fedorchenko. Techniques of the automated response on the security incidents during information and security events management in the systems of interacting services. XXIX International Conference "Mathematical methods in technics and technology - MMTT-29", May 31 - June 3, 2016, St. Petersburg State Technological Institute, St.Petersburg, Russia, Vol.10, 2016.
77. Dmitry Levshun, Andrey Chechulin, Igor Kotenko. Architecture of the integrated security system. XXV All-Russian Conference "Methods and technical tools of information security" (MTTIS 2016). Proceedings. St. Petersburg, Russia. July 4-7, 2016. pp.53-54.
78. Igor Saenko, Igor Kotenko, and Sergey Kruglov. Approach to the solution of “a role mining problem” when forming the RBAC model on the basis of genetic algorithms. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp. 113.

79. Igor Saenko, Aleksey Kushnerevich, Igor Kotenko, and Yan Kopchak. Approach to implementation of parallel stream data handling for security monitoring of the Internet of Things network. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.38-39.
80. Alexander Branitskiy. Artificial immune systems as a concept for detection and classification of attacks under conditions of dynamically changing traffic. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp. 12-13.
81. Vasily Desnitsky. An approach to information flow verification of Internet of things systems. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.34-35.
82. Elena Doynikova. Models, techniques and algorithms for calculation of the information systems security metrics in scope of the hierarchical system of the security metrics. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.45-47.
83. Oleg Lauta, Mikhail Kotsynyak, and Igor Saenko. Development of models of the computer attacks on the basis of a method of topological conversion of stochastic networks. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.104-105.
84. Evgenia Novikova. Generation of the patterns of objects movement in the dynamic environment. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.106-108.
85. Andrey Fedorchenko. Security events correlation for target attacks detecting. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.32-33.
86. Andrey Chechulin. The main types of network changes that should be taken into account during the construction of analytical attack models. XXV All-Russian Conference “Methods and technical tools of information security” (MTTIS 2016)”. Proceedings. St.Petersburg, Russia. July 4-7, 2016. pp.114-115.
87. Igor Saenko, Igor Kotenko, and Sergey Kruglov. Genetic approach to reconfiguring the diagrams of role access in the common infor-

mation space. International congress IS&IT - International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 4-11, 2016. Taganrog, UFY, 2016. Vol. 1. pp. 13-18.
88. Elena Doynikova, Igor Kotenko. Technique and software tool for the countermeasure selection in computer networks on the base of the dynamical recalculation of security metrics. International congress IS&IT - International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 4-11, 2016. Taganrog, UFY, 2016. Vol. 2. pp. 271-276.
89. Andrey Chechulin, Dmitry Novozhilov. Development of a test bed for efficiency evaluation of intelligent methods for websites classification. International congress IS&IT - International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 4-11, 2016. Taganrog, UFY, 2016. Vol. 2. pp. 32-37.
90. Vasily Desnitsky. Detection of anomalous data from sensors in the information and telecommunication systems with embedded devices. International congress IS&IT - International Conference on Artificial Intelligence and Systems. Proceedings. Divnomorskoye, Russia. September 4-11, 2016. Taganrog, UFY, 2016. Vol. 1. pp. 217-223.
91. Igor Saenko, Aleksey Kushnerevich and Igor Kotenko. Implementation of the distributed parallel computing framework for collecting and preprocessing the big monitoring data in cyber-physical systems. International Congress on Computer Science: Information Systems and Technologies (CSIST'2016). Proceedings. Minsk, October 24 – 27, 2016. pp. 641-645.
92. Nickolay Komashinsky, Igor Kotenko. Analysis of the approaches for the detection of the targeted attacks. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 167-168.
93. Igor Kotenko, Igor Ushakov. Using big data for monitoring of security incidents. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016 (RI-2016)”. Proceedings. St. Petersburg, 2016. pp. 168-169.
94. Dmitry Levshun, Andrey Chechulin, Igor Kotenko. Secure inter-controller interaction based on I2C protocol. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 169-170.

95. Eugene Merkushev, Igor Kotenko. Analysis of properties of cloud computing security ecosystem. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 179-180.
96. Anton Pronoza, Igor Kotenko. Actual problems of the big data visualization in the security information and events management systems. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 189-190.
97. Anton Pronoza, Igor Kotenko. Analysis of the big data visualization models for the task of monitoring of the large-scale computer networks. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 188-189.
98. Igor Saenko and Igor Kotenko. Models and methods of the visual analysis of diagrams and policies of access control for the common information space resources. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 192-193.
99. Alexander Branitskiy. Combined approach to detection of network attacks based on signature analysis and computational intelligence methods. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 150.
100. Alexander Branitskiy, Maxim Colomeec. Development of visualization system of computer networks based on Voronoi diagram. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 150-151.
101. Mikhail Bulgakov, Andrey Chechulin. Development of hardware and software for the simulation of the security incidents in railway systems. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 151.
102. Vasily Desnitsky, Andrey Chechulin. Information flow verification technique for Internet of things systems. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 156-157.

103. Vasily Desnitsky, Vladislav Alexandrov. An intruder model for information and telecommunication Internet of Things systems. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 155-156.
104. Elena Doynikova. Security assessment on the base of graphs and open standards for the networks with mobile components. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 158-159.
105. Maxim Kolomeec, Andrey Chechulin, Yan Kopchak. Development of a graphical interface for visualization of computer network security systems. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 166-167.
106. Dmitry Levshun, Andrey Chechulin. Comparison of approaches for the construction of a database for the organization of research materials in a unified repository for multimedia data from field ethnographic expeditions. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 330-331.
107. Dmitry Novozhilov, Andrey Chechulin. Metrics for the analysis of structural features of web pages by machine learning methods. XV Jubilee St. Petersburg International Conference “Regional informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 184-185.
108. Igor Saenko, Aleksey Kushnerevich, and Sergey Bushuyev. Framework for the parallel distributed traffic analysis in the computer networks for security incidents detection. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 193-194.
109. Mikhail Mikhailov, Andrey Chechulin. Scanner based on clustering and correlation methods for data warehouses. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp. 181.
110. Andrey Fedorchenko. Host-based technique of security events correlation. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016. pp.199-200.

Laboratory for Information-Analytic Technologies for Economics

Head of Laboratory: Dr. Tech. Sci. Prof. 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. Prof.– Grankin, Boris – modeling and system analysis for technical complexes functioning, advanced information technologies for technical complexes design, borisgrankin@mail.ru

Leading Researcher Dr. Tech. Sci. – Fedorov Alexey – 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 PhD Assoc. Prof. – Bakuradze, Dmitry – modeling of complex technical systems, operations management, optimization of systems functioning, bdv@iias.spb.su

Senior Researcher PhD Assoc. Prof – Geida, Alexander – 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. No. 15-08-01825-a “Conceptual and meth-

odological 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", 2015 - 2016.

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", 2016

Lysenko, I.V., Fedorov, A.V. – Federal Program "Maintaining, Development and Use of GLONASS system in 2012 - 2020 years". The project No. 11607-11/2014_2015 of September 4, 2014. OCD of "NKU–RAN" the 3d stage: "Participation in preparation and carrying out of complex intercorporate tests regarding space vehicle ground guidance systems software and measurement techniques provided by SPIIRAS", 2016.

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" 2d 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., Geida, A.S. – FP1. The project No. 503-2015 of December 1, 2015. "Development of the module of the mathematical problems solution for estimation, analysis and synthesis based on armaments operational properties indicators for compliance monitoring of armaments produced by government order and for export, to requirements of customers", Code "Monitoring-VVST-SPIIRAS", 1st stage: "Development of the engineering design of the mathematical problems solution module for estimation, analysis and synthesis based on armaments operational properties indicators for compliance monitoring of armaments produced by government order and for export, to requirements of customers".

Lysenko, I.V., Geida, A.S. – FP1. The project No. 503-2015 of December 1, 2015. “Development of the module of the mathematical problems solution for estimation, analysis and synthesis based on armaments operational properties indicators for compliance monitoring of armaments produced by government order and for export, to requirements of customers", Code "Monitoring-VVST-SPIIRAN", 2d stage: "Development of armaments compliance monitoring to requirements of stakeholders subsystem on the basis of estimation, analysis and synthesis with indicators of armaments operational properties (regarding use of the RMZPO module). Development of engineering and operational documentation on the RMZPO module. Preliminary tests of a prototype of the RMZPO module (paragraph 12.1)".

Lysenko, I.V., Geida, A.S. – FP1. The project No. 10-222/11 of December 16, 2014. Code “Soyuz-2014-SPIIRAN”. “Research of Collective Security Treaty Organization (CSTO) member states economic cooperation mechanisms and proposals preparation on measures of their improvement based on modern information technologies usage and usage of mathematical modeling methods”. 2d stage: "Research of problems in the field of military and economic cooperation of the organizations of the Russian military industrial complex with the enterprises of member states of the CSTO and proposals preparation as of measures directed to problems decision”.

Lysenko, I.V., Bakuradze, D.V. – FP1. The project No. 13/2011, November 10, 2014. “Measures development to improve Russian national standard and legal base in the field of military and economic cooperation with the foreign states and offers proposals to carry out further actions in the field of reforming and development of military industrial complex“. Code “VTS 2014-SPIIRAS“. 3d stage: "Research of mechanisms of a military-economic cooperation of states - CSTO members (participants of the CIS) and development of offers on measurements of cooperation enhancements.“

Conferences

Geyda, A.S. Information technologies usage operational properties research: modeling concepts and principles. XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, 2016", October 26-28, 2016.

Geyda A.S. Second International Scientific Conference “Crisis of the 21st Century: Problems and Solutions": Systems and processes of their functioning improvements’ research problems: implementation to the state public programs.

Intellectual property

1. 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

2. 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

Recent Results

1. Concepts and the principles of a complex technical systems potentiality research investigated, the classification scheme of potentiality research problems described [1,2]. research problems

2. The scheme of information technologies operational properties research problems solution, the scheme of modeling in these problems [1,3] is proved.

3. The analysis of systems and processes of their functioning operational properties research problems modeling is made, schemes of modeling and standard fragments of the models used for the solution of the tasks specified [1,4] are offered.

4. The program for the estimation, analysis and synthesis mathematical problems of systems characteristics and processes of their functioning by indicators of their operational properties [4,9] is developed.

References

Papers Published in Russian Editions Indexed by RSCI

1. Geyda, A. S., Lysenko, I. V., Yusupov, R. M. Information technologies’ operational properties usage research: concepts and the principles of modeling//St. Petersburg society of informatics, computer facilities, communication systems and management (SPOISU). XV Jubilee St. Petersburg International Conference “Regional Informatics-2016” (“RI-2016”). Proceedings. St. Petersburg, October 26-28, 2016.

2. Geyda, A. S., Ismailova, Z. F., Klitny, I. V., Lysenko, I. V. Concept of the solution of systems and processes of their functioning enhancement tasks, as mathematical tasks. Euroasian Union of Scientists (EUS). Monthly Scientific Journal. Issue 31, 2016.
3. Geyda A. S., Ismailova Z. F., Klitny I. V., Lysenko I. V. Operational properties research problems for state public programs. Institute of management and social and economic development. Economy and Society. Saratov: 2016.
4. Geyda A. S. Research problems of systems and processes of their functioning enhancements: case of state public programs implementation. Materials of the Second international scientific and practical conference "Crisis of the 21st century: problems and solutions". The Saratov State Technical University. Saratov: 2016.

Other publications

5. Geyda, A. S., Lysenko, I. V., Yusupov, R. M. Analytical forecast estimation of operational properties in military industrial complex and the solution of research problems of defense industry enterprises based on these properties. Materials of the First scientific and practical conference "Questions of Economic Management in Defense Industry Complex of Russia". Moscow, December 10-11, 2015. M.: "Connect". 2016.

Laboratory of Computing and Information Systems and Software Engineering

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

Laboratory Staff – 17 members, 2 scientific degree applicants, 3 post graduate students.

Research Activities

Corporate user systems; parallel and distributed data processing; dynamic architecture supercomputers (DASC); architecture and hardware decisions in DASC; software for DASC; application of dynamic architecture processors (DAP) in logistics and digital signal processing; GRID technologies; cloud computing; neural networks; computer modeling; mathematical modeling; risk analysis and modeling for information systems; multiscale problems; information security; network security monitoring; object oriented programming; software engineering; cognitive technologies; ontological modeling; e-documents circulation; software design automation; converged infrastructures; big data.

Research Fellows

Chief Researcher Dr. Nat. Sci. Prof. – Baranov, Sergey Nicolayevich – software engineering, SNBaranov@iias.spb.su

Chief Researcher Dr. Tech. Sci. Prof. – Vorobiev, Vladimir Ivanovich – 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. Prof. – Torgashev, Valery Antonovich – distributed computer systems (DCS) and supercomputers with dynamic architecture, parallel computations, vator@mail.ru

Chief Researcher Dr. Tech. Sci. Prof. – Nikiforov, Victor Vikent'evich – real-time operating systems, embedded real-time software systems, nik@iias.spb.su

Senior Researcher PhD Prof. – Mustafin, Nikolay Alexeevich – discrete optimization, GIS technologies, image processing, nikolay.mustafin@gmail.com

Senior Researcher PhD – Shishkin Vladimir Mikhailovich – information security, security and risk modeling and analysis, social technology systems security, vms@iias.spb.su

Senior Researcher PhD – Fatkieva, Rosa Ravilievna – information systems modeling, rrf@iias.spb.su

Senior Researcher PhD – Evnevich, Elena Ludvigovna – cloud and distributed computations, cognitive technologies, eva@iias.spb.su

Researcher – Levonevsky, Dmitry Konstantinovich – analysis and simulation of network traffic in information systems, dle-wonewski.8781@gmail.com

Junior Researcher PhD – Podkorytov Sergey Alexeevich – theory of fractals, 3D modeling, podkorytovs@gmail.com

Scientific Degree Applicants

Fatkieva, Rosa Ravilievna, applicant for Dr. Tech. Sci. Degree – Models and Methods of Complex Assessment and Prognosis of Network Security in Mechanical Engineering Industry, scientific consultant Prof. Osipov, V.Yu.

Levonevsky, Dmitry Konstantinovich, applicant for PhD – Creation of Corporate Smart Space on the Basis of e-Services, superviser Prof. Osipov V.Yu.

Defense of the Theses

Nosal, Irina Alekseevna – Justification of Information Security Measures of Socio-Critical Facilities, PhD in the specialty 05.13.19, head Prof. Osipov V.Yu.

Post-graduate Students

Uzdyaev, Mikhail Yurievich – Models and Methods of Robotic Control by Neural Networks, superviser Prof. Osipov, V.Yu.

Obrezkov, Dennis Vassilievich – Performance Maintenance of Hard- Software System for Inertial Satellite Navigation under Obstructing Interference, superviser Dr. Fatkieva, R.R.

Ryzhkov, Sergey Romanovich – Cloud Computing Security, superviser Prof. Vorobiev, V.I.

Grants and Projects

Mustafin, N.A. – RFBR Grant No. 16-07-00463-a “Theoretical and Technological Basics for Constructing Polymodel Context Aware Decision Support Systems “, 2016 - 2018.

Osipov, V.Yu., Fatkieva, R.R., Shishkin, V.M., Levonevsky, D.K. – RFBR Grant No. 16-29-09482 ”Forecasting of Information Network Terrorist Threats and Substantiation of Respective Countermeasures in Megapolises”, 2016 - 2018.

Vorobiev, V.I. – Contract No. 09/2015 on on-line computation according to hydrodynamic weather forecast models, 2015 - 2016.

University Courses

St.Petersburg State Electrotechnical University, Chair of information technologies and computer security, “Fundamentals of Computer Security”, Vorobiev, V.I.

St.Petersburg State Electrotechnical University, Chair of information security, “Fundamentals of Information Security”, Fatkieva, R., Shishkin, V.M.

St.Petersburg State Electrotechnical University, Chair of information systems, “Theory of Decision Making”, “Optimization Methods”, Mustafin, N.A.

St.Petersburg State Polytechnic University, Chair of information and control systems, "Metrology, Standardization, and Certification in a Software Project", Baranov, S.N.

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, postgraduate program, “Mathware and Software of Computing Complexes and Computer Networks”, section “Real-time Systems” – Nikiforov V.V., section “Software Project Maintenance” – Baranov, S.N.

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

Conferences

XII Baltic Science and Engineering Contest 2016, ST. Petersburg, February 1-4, 2016 – Baranov, S.N.

International Science and Practice Conference “Problems of Information Security”, Simferopol-Gurzuf, February 25-27, 2016 – Shishkin, V.M., Levonevsky D.K., Vorobiev V.I., Petrov M.Yu.

International Research and Practice Conference “Theoretic and Applied Aspects of Information Security”, Academy of the Ministry of Home Affaires of the Republic of Belarus”, Minsk, December 22, 2016 – Shishkin, V.M.

9th International Conference "Polynomial Computer Algebra" (PCA- 2016), St. Petersburg, April 18-23, 2016 – Baranov, S.N., Nikiforov, V.V.

18th International Conference of Open Innovations Association FRUCT, St. Petersburg, Russia, April 18-22, 2016 – Baranov, S.N., Nikiforov, V.V.

XXV All-Russian Scientific School Conference “Intellectual Renaissance”, St. Petersburg, April 22-25, 2016 – Shishkin, V.M.

XIX IEEE International Conference on Soft Computing and Measurements (SCM’2016), St. Petersburg, May 19-21, 2016 – Vorobiev, V.I., Levonevsky, D.K., Fatkieva, R.R.

IV International Baltic Marine Forum, IV International Scientific Conference ”Marine Technology and Engineering. Safety of the Marine Industry”, Kaliningrad, May 22-28, 2016 – Shishkin, V.M., Evnevich, E.L.

7th International Workshop "Program Semantics, Specification and Verification: Theory and Applications" (PSSV 2016), June 14-15, 2016 – Baranov, S.N., Nikiforov, V.V.

17th Session of the Expert Council of Interparliamentary Assembly of Member Nations of the Commonwealth of independent States and Regional Commonwealth in the Sphere of Communications, St. Petersburg, May 31, 2016 – Shishkin, V.M.

12th Euro-Asian Forum on Information Cooperation and Information Security ”INFOFORUM-Crimea”, Sevastopol, June 27 – July 1, 2016 – Shishkin, V.M.

13th International Symposium on Neural Networks (ISNN 2016), St. Petersburg, July 6-8, 2016 – Baranov, S.N., Osipov, V.Yu., Levonevsky, D.K., Vorobiev, V.I., Evnevich, E.L.

9th International Conference on Security of Information and Networks (SIN 2016), New Jersey, USA, July 20-22, 2016 – Levonevsky, D.K., Vorobiev, V.I., Evnevich, E.L., Fatkieva, R.R.

18th International Conference “Speech and Computer (*SPECOM-2016*)”, Budapest, Hungary, August 23-27, 2016 – Levonevsky, D.K.

32nd EuroForth Conference, Hotel "Mein Inselglück", Reichenau, Germany, September 7-11, 2016 – Baranov, S.N.

X International School-Symposium “Analysis, Modeling, Control, Development of Social and Economical Systems”, Simferopol – Sudak, September 12-21, 2016 – Shishkin, V.M.

II Interregional Theoretical and Practical Conference “Advanced Lines of Development in National Information Technologies”, Sevastopol (Crimea), September 13-17, 2016, – Baranov, S.N., Mustafin, N.A., Shishkin, V.M.

15th International Conference on Modeling and Applied Simulation (MAS2016), Cyprus, September 26-28, 2016 – Mustafin, N.A.

9th Russian Multiconference on the Problems of Control. 9th Conference “Information Technologies in Control” (ITC-2016), St. Petersburg, October 4-6, 2016 – Osipov, V.Yu., Baranov, S.N., Nikiforov, V.V., Vorobiev, V.I., Levonevsky, D.K., Fatkieva, R.R., Ryzhkov, S.R., Evnevich, E.L.

27th International Science and Technology Conference “Extreme Robotics”, St. Petersburg, October 24-25, 2016 – Nikiforov, V.V.

XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016 – Baranov, S.N., Mustafin, N.A., Shishkin, V.M., Levonevsky, D.K., Vorobiev, V.I., Evnevich, E.L., Fatkieva, R.R., Petrov, M.Yu., Bachiev, R.I., Ryzhkov, S.R., Uzdyaev, M.Yu., Podkorytov, S.A.

International Scientific School “Modeling and Analysis of Safety and Risk in Complex Systems” (MASR – 2016), St. Petersburg, October 25-28, 2016 – Shishkin, V.M.

Interdisciplinary Seminar of the Orbely Brothers Institute “Information Potential of Biologic Objects”. I.M.Sechenov Institute of Evolutional Physiology and Biochemistry, October 30, 2016 – Osipov, V.Yu.

8th Theoretical and Practical Conference “Information Security. Nevsky Dialog”, St. Petersburg, November 8-9, 2016, in the frames of the 25th SECURICA exhibition, St. Petersburg – Shishkin, V.M.

5th National Supercomputer Forum (NSCF-2016), Pereslavl’ Zalessky, November 29 – December 2, 2016 – Vorobiev, V.I., Levonevsky, D.K., Ryzhkov, S.R., Fatkieva, R.R.

International Theoretical and Practical Conference “Staff Training for Subjects of a National Security Assurance System. History and Present Day”, Institute of National Security of the Republic of Belarus, Minsk, December 22, 2016 – Shishkin, V.M., Levonevsky, D.K.

Research Management

XII Baltic Science and Engineering Competition 2016, St. Petersburg, February 1-4, 2016 – Chairman of the scientific jury of the section “Computer Programming” – Baranov, S.N.

XXV All-Russian Scientific School Conference “Intellectual Renaissance”, St. Petersburg, April 2016, section supervision, jury participation – Shishkin, V.M.

9th Russian multiconference on the problems of control. 9th Conference “Information Technologies in Control” (ITC-2016), St. Petersburg, October 4-6, 2016 – section supervision, section report prepation, secretary of the section – Osipov, V.Yu., Evnevich, E.L.

XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016 – Program committee membership – Vorobiev, V.I., Fatkieva, R.R., Shishkin, V.M.; section work programs development, session organization, section reports preparation – Vorobiev, V.I., Fatkieva, R.R., Shishkin, V.M., Petrov, M.Yu.

Ongoing City Seminar "Informatics and Computer Technologies", twice a month, SPIIRAS; in 2016: 8 sessions, 9 presentations, 15 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.

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

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

Baranov, S.N. – Professional member of the ACM (Association for Computing Machinery) since 2000 – http://www.acm.org/; Professional member of the IEEE (Institute of Electrical and Electronics Engineers) since 2000 – http://www.ieee.org; member of the editorial board of the "SPIIRAS Proceedings" – http://www.proceedings.spiiras.nw.ru/; reviewer of American Mathematical Society (Mathematical Reviews) http://www.ams.org/; member of the committee on standard of the Forth language (Forth Standards Committee) – http://www.forth200x.org/meetings/minutes2016; member of the editorial board of a journal “System Informatics” – http://www.system-informatics.ru/ru/about.

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

Fatkieva, R.R. – reviewer of the “Mathematics and Statistics” (ISSN: 2332-2144) Journal.

Intellectual Property Registered in the Reporting Year

Levonevsky, D.K., Fatkieva, R.R. Program of event aggregation of intrusion detection systems. Certificate No. 2016612251. Registered in the Computer Program on 20.02.2016.

Baranov, S.N. Program RTMT for simulating multi-task applications execution. Certificate No. 2016613095. Registered in the Computer Program Registry on 16.03.2016.

Nikiforov V.V. Program OEKPP for estimating efficiency of software application configurations Certificate No. 2016618872. Registered in the Computer Program Registry on 09.08.2016.

Recent Results

1. New algorithms for deductive automatic synthesis of cyclic and self-reproducing programs for intellectualization of autonomous robots activities were developed [2, 7].

2. An approach to check feasibility of real-time multi-task applications in various combinations of scheduling disciplines and protocols of access to shared information resources was developed, when applications run on a multi-core computer platform and the application structure is specified with a simple formalized profile of segments of three types. The approach is based on the concept of software application density which characterizes the potential efficiency of computer resource usage by the profiled application, determined by assessing its feasibility depending on the processor performance with the developed software simulation tools [1, 4, 13, 21, 22, 23, 26, 28, 29].
3. An approach to study the influence of parameters of an associative intelligent machine based on a multi-layer recurrent neural network on the effectiveness and efficiency of incoming information processing under various spacial and timing configurations of the machine was developed. The approach makes use of the Forth technology and of an open user interface to other specialized tools of analysis and visualization of the data obtained [5, 10, 30, 39].
4. A concept of application of dynamic architecture multi-processors (DAMP), including dynamic architecture supercomputers (DASC) created on the basis of dynamic automata networks, to the implementation of social-cyber-physical systems for various purpose was developed as well as a concept of applying DAMP (dynamic architecture multiprocessors) and PDA (processors with dynamic architecture) for intelligent control of robotic systems, including those on the basis of neural networks [14].
5. An approach to gamification of training in system and network administration was developed. The game process is based on cloud services. A game model was developed, a cloud system architecture was designed, and game-mode training methods were suggested. The advantages of the approach are application of real operating systems and software, high level of user involvement, weak requirements to client nodes, and high level of fail tolerance [16, 31, 45].
6. A method of information security control of virtual computer perimeter in a cloud structure through correlation between digital (logical, physical) and geographical landscapes was developed. Recognition of the fact of crossing the border is triggered by tracking and locating information on the basis of geo-tagging and taking into account the principal risks for cloud infrastructures from the point of view of attacks and system security activities. Processing of events of dynamic crossing of the cloud infrastructure perimeter by information flows is performed by a neural network as a means for data migration control [7, 11, 18, 24, 25, 32, 35, 37].

7. Computation methods and a technology on the basis of cognitive approach to complex risk analysis were developed. The methodology provides quantitative stochastic estimates of risk factors significance in the complex poorly structured social technological systems on the basis of structural information which formalizes and integrates verbal expert knowledge [19, 27, 33, 42, 43, 44].
8. An interactive analytical system of recommendations development for selecting cryptographic standards or resources of information system taking into account individual features and preferences of the user was outlined. The system comprises statistical evaluation methods of user activities, methods of unstructured data processing and contextual analysis based on recommending systems [9, 12, 34].

Awards

Levonevsky, D. K. - Commemorative Badge “70 Years of the National Security Institute, Republic of Belarus”.

Shishkin, V. M. - Commemorative Badge “70 Years of the National Security Institute, Republic of Belarus”.

References

Papers Published in Venues Indexed in WoS, Scopus

1. Baranov, S.N., Nikiforov, V.V. Multi-Partite Graphs and Verification of Software Applications for Real-Time Systems. // Cybernetics and Information Technologies. Bulgarian Academy of Sciences, Sofia. 2016. Vol. 16, No. 2, pp.85-96
2. Osipov, V.Yu. Automatic Synthesis of Action Programs for Intelligent Robots // Programming and Computer Software, Pleiades Publishing, Ltd., 2016. Vol. 42. No. 3, pp. 155-160.
3. Baranov, S.N., Nikiforov, V.V. The Impact of Blocking Factor on Real-Time Applications Feasibility. // Open Innovations Association and Seminar on Information Security and Protection of Information Technology (FRUCT-ISPIT), 2016 18th Conference of. – FRUCT, 2016, pp. 15-20.
4. Baranov, S.N. Real-Time Multi-Task Simulation in Forth. // Open Innovations Association and Seminar on Information Security and Protection of Information Technology (FRUCT-ISPIT), 2016 18th Conference of. – FRUCT, 2016, pp. 21-26.
5. Fatkieva, R., Vorobiev, V., Levonevskiy, D. Approach to information security control of complex computer networks. Proceedings of 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM), St. Petersburg, May 25-27, 2016, pp. 71-72.
6. Sokolov, B., Potryasaev, S., Mustafin, N., Nemykin, N., Kalinin, V. Optimal Structure Coordination in Supply Chain: Principles, Models, Methods and Algorithms for the SC Structure Dynamics Control // Proceedings of the 15th International Conference on Modeling

and Applied Simulation (MAS2016). Cyprus, September 26-28, 2016, pp. 31-38.
7. Osipov, V.Yu. Space-Time Structures of Recurrent Neural Networks with Controlled Synapse, 13th International Symposium on Neural Networks (ISNN 2016), St. Petersburg, July 6-8, 2016 // Advances in Neural Networks – ISNN 2016. LNCS 9719, pp. 177-185.
8. Baranov, S.N. A Practical Simulator of Associative Intellectual Machine, 13th International Symposium on Neural Networks (ISNN 2016), St. Petersburg, July 6-8, 2016 // Advances in Neural Networks – ISNN 2016. LNCS 9719, pp.185-195.
9. Vorobiev, V.I., Evnevich, E.L., Levonevskiy, D.K. Classifying large aerospace images by the multi-alternative discrete accumulation method, 13th International Symposium on Neural Networks (ISNN 2016), St. Petersburg, July 6-8, 2016 // Advances in Neural Networks – ISNN 2016. LNCS 9719, pp. 40-49.
10. Vorobiev, V., Evnevich, E., Fatkieva, R., Fedorchenko, L., Levonevskiy, D. Criteria and Indices of Computer Network Protection. 9th International Conference on Security of Information and Networks (SIN 2016), New Jersey, USA, July,20-22,,2016. ACM International Conference Proceedings Series 9/ Ser. “Proceedings of the 9-th International Conference on Secirity of Information and Networks, SIN 2016”, 2016, pp. 176-177.

Papers Published in Russian Venues Indexed in RSCI

11. Vorobiev, V.I., Evnevich, E.L., Levonevskiy, D.K., Fatkieva, R.R., Fedorchenko, L.N. Studying and Selecting Cryptographical Standards Based on Intellectual Analysis of the Documents. SPIIRAS Proceedings (Trudy SPIIRAN), Vol. 5(48), 2016. pp. 69-87.
12. Nikiforov, V.V., Tyugashev, A.A. Access to Shared Resources in Real-Time Systems with Volatile Task Priorities // University Transactions. Instrument Building (Izvestiya VUZov, Priborostroenie), Vol.59, No. 12, 2016. pp. 964-970.
13. Torgashev, V. A., Carev, I. V. Implementation of Supercomputers with Dynamic Architecture on the Modern Element Base // Information and Control Systems (Informacionno-upravlyayushchie sistemy). No. 6, 2016. pp. 74-84.
14. Nikiforov, V.V., Pavlov, V.A. Increasing the Efficiency of Realization of Software Complexes for Robotic Systems // Robotics and Mechatronics (Robototekhnika i mekhatronika), No. 2(11), 2016. pp. 56-61.
15. Baranov, S.N., Nikiforov, V.V. Analysis of Real-Time Applications Feasibility through Simulation // Modelirovanie i analiz informacionnyh sistem, 2016, Vol.23, No. 6. pp. 673–687.
16. Levonevsky, D.K. Practical Aspects of Protecting Network Protocols of the Application Level. Problems of Information Security: Proc. of the II International Theoretical and Practical Conference

Gurzuf, February 25-27, 2016 / Ed. by Prof. O.V. Bojchenko. – Saki: IP Brovko, A.A., 2016. pp. 222-223.
17. Shishkin, V.M. The Securiry Price of Critycal Objects with Non-Linear Cost Calculation. Problems of Information Security: Proc. of the II International Theoretical and Practical Conference, Gurzuf, February 25-27, 2016 / Ed. by Prof. O.V. Bojchenko. – Saki: IP Brovko A.A., 2016. pp. 48-53.
18. Vorobiev, V.I., Petrov, M.Yu. Data Protection in Convergent Cloud Infrastructures. Problems of Information Security: Proc. of the II International Theoretical and Practical Conference Gurzuf, February 25-27, 2016 / Ed. by Prof. O.V. Bojchenko. – Saki: IP Brovko A.A., 2016. pp. 19-21.
19. Shishkin, V.M. Structural Information and Assessment of Risk Factors in Risk Analysis. Analysis, Modeling, Control, Development of Social Non-Econimy Systems. Proceeding of the X International Symposium AMUR-2016, Simferopol'-Sudak, September 12-21, 2016 / Ed. by A.V. Sigal. – Simferopol': V.I. Vernadsky Crimea University, 2016. pp. 420-425.
20. Baranov, S.N., Nikiforov, V.V. Software Simulation as a Means to Estimate Feasibility of Real-Time Software Applications. // International Conference on Polynomial Computer Algebra, April 18-23, 2016, St. Petersburg, Russia, pp. 17-20.
21. Baranov, S.N., Nikiforov, V.V. Application Density and Feasibility Checking in Real-Time Systems. The Seventh Workshop "Program Semantics, Specification and Verification: Theory and Applications" (PSSV 2016, June 14-15, 2016) // System Informatics (Sistemnaya informatika), No. 7 (2016), pp.1-9.
22. Baranov, S.N., Sokolov, B.V. Telezhkin, A.M. Mustafin, N.A. Risk Models in Software Projects // Proceedings of the II International Theoretical and Practical Conference "Advanced Lines of Development in National Information Technologies", September 13-17, 2016, Sevastopol', 2016. pp. 45-46.
23. Baranov, S.N., Nikiforov, V.V. Estimating the Efficiency of Real-Time Software Applications with Software Simulation // Proceedings of the 9th Conference "Information Technologies in Control" (ITU-2016), – St.Petersburg: «Concern «Elektropribor», 2016. pp. 132-141.
24. Vorobiev, V. I., Ryzhkov, S.R., Fatkieva, R.R. Applying Neural Networks to Control the Perimeter of Information Security // Proceedings of the 9th Conference "Information Technologies in Control" (ITU-2016), – St.Petersburg: «Concern «Elektropribor», 2016. pp. 317-320.

25. Levonevsky, D. K., Fatkieva, R. R. Neural Network Technologies in Control Systems of Network Security // Proceedings of the 9th Conference "Information Technologies in Control" (ITC-2016), – St.Petersburg: “Concern “Elektropribor””, 2016. pp. 365-366.
26. Nikiforov, V.V. The Efficiency of Sharing Computing Resources among Tasks in Robotic Control Systems. // Proceedings of the 27th International Conference "Extreme Robotics", St.Petersburg, October 24-25, 2016. pp. 255-261.
27. Shishkin, V.M. Estimating the Probability of Threats with Structural Information under Expert Assessment // Proceedings of the 14th International Symposium "Modeling and Analysis of Security and Risk in Complex Systems" (MABR-2016)” // St.Petersburg, October 25-28, 2016. pp. 197-202.

Other Publications

28. Baranov, S.N., Mustafin, N.G., Telezhkin, A.M. Risk Management in Software Projects // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. pp. 144.
29. Levonevsky, D.K. Image Recognition on Digital Pictures in the Problem of Enterprise Security Ensurance // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. pp. 170-171.
30. Fatkieva, R.R. Building a System of Informaiton Security Indicators for and Industiral Enterprise. // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. pp. 198-199.
31. Shishkin, V.M. Metrical Assessment of Risk Factors on the Basis of Structural Information under the Cognitive Approach // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. pp. 201-202.
32. Evnevich, E.L. Determining the Development Trends of Cognitive Technologies Based on Analysis of Patent Information // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. pp. 327-328.
33. Vorobiev, V.I., Petrov, M.Yu. Methods of Converging Cloud Computing with Big Data // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. pp. 524.
34. Bachiev R. I. Recognition of Complex situations in Digital Images // Proceedings of the Jubilee XV St.Petersburg International Conference "Regional Informatics" (RI-2016), St. Petersburg, 26-28 October 2016. pp. 277.

35. Ryzhkov, S.R. Applying Neural Networks to Determine the Perimeter pf Cloud Computong // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)", St. Petersburg, October 26-28, 2016. pp. 48.
36. Uzdyaev, M.YU. The CUDA Technology in Face Recognition. // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)", St. Petersburg, October 26-28, 2016. pp. 529-530.
37. Podkorytov, S.A. Modeling of Smooth Self-Similar Surfaces // Proceedings of the XV Jubilee St.Petersburg International Conference "Regional Informatics (RI-2016)", St. Petersburg, October 26-28, 2016. pp. 491.
38. Baranov, S.N. Simulating Recurrent Neural Networks in Forth. // Proc. 32nd EuroForth Conference, September 9-11, 2016. Hotel Mein Inselglück, Insel Reichenau, Germany, pp.30-38.
39. Petrova, T.B. Biometriya. Illnesses of Growth // Information Security, No. 4, 2016. pp. 52-53. http://www.itsec.ru/imag/insec-4-2016/
40. Shishkin, V.M. Means of Systemic Assessment of Heterogenic Threats and Counter-Measures // Proceedings of the Internatinal Conference "Social and Phsycological Aspects of Ensuring National Security", Minsk, December 3-4, 2015, Ed. by S.N. Knyazev. – Minsk, 2016. – Vol.2. pp. 113-116.
41. Shishkin, V.M., Evnevich, E.L. A system of Stochasic Risk Analysis for Estimating Navigation Safety // Proceedings of the IV International Baltic Marine Forum, IV International Scientific Conference “Marine technologies. Marine Industry Security”. Papers Abstracts. Part 1. – Kaliningrad: BGARF, 2016. pp. 60-62.
42. Shishkin, V.M., Evnevich, E.L. A system of Stochasic Risk Analysis for Estimating Navigation Safety // Proceedings of the IV International Baltic Marine Forum 2016. pp. 124-134. http://www.klgtu.ru/upload/science/conferences/bmf/2016/Электронное%20издание.pdf.
43. Levonevsky, D.K. Game Training and a Cloud Service. V National Supercomputer Forum (NSCF-2016), Pereslavl'-Zalesskij, November 29 – December 2, 2016. http://www.nscf.ru/materialy-foruma/
44. Vorobiev, V.I., Levonevskij, D.K., Ryzhkov, S.R., Fatkieva, R.R. Security Management for Convergent Technologies in a Cloud Environment. V National Supercomputer Forum (NSKCF-2016), Pereslavl'-Zalesskij, November 29 – December 2, 2016. http://www.nscf.ru/materialy-foruma/

Laboratory of Autonomous Robotic Systems

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

Laboratory Staff – 14 members and 3 PhD students.

Research Activities

Research and development of mathematical models, software and hardware of autonomous robotic systems, including methods of group interaction, supervision control, mechanical linkages and topological robotics, humanoid robot kinematics and system-on modules prototypes.

Research Fellows

Chief Researcher Dr. Tech. Sci. Prof. Honored Scientists of the Russian Federation – Felix Kulakov – supervisory control robots, automation of mechatronic and robotic systems, virtual and augmented reality, kul@iias.spb.su

Leading Researcher Dr. Phys. – Math. Sci. – Gaiane Panina – mechanical linkages, topological robotics, geometric models and algorithms, geometry of polytopes, gaiane-panina@rambler.ru

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

Senior Researcher PhD – Viktor Budkov – methods and models of audio-visual signal processing in web-systems for supporting distributed meetings, budkov@iias.spb.su.

Junior Researcher MSc – Nikita Pavliuk – software and structural-functional models of networking cooperation of anthropomorphic robots, antei.hasgard@gmail.com

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

Junior researcher, MSc – Svetlana Chernakova – intelligent technologies for robots training by movement demonstration, virtual reality, human-machine interfaces, chernakova@iias.spb.su

PhD students

Irina Vatamaniuk - Methods and software tools for analysis of the significance of audiovisual information flows in multimodal interfaces of robotic and information management systems (surpervisor – A. Ronzhin), vatamaniuk@iias.spb.su

Alexander Denisov - Methods and software tools for the motion control of robot with anthropomorphic kinematics (surpervisor – A. Ronzhin), denisov@iias.spb.su

Vitaliy Gaponov - Methods of coordinated network management and embedded software for robotic system actuators (supervisor – V. Dashevskiy), gaponov@iias.spb.su

Grants and Projects

Ronzhin, A. - RSF Project No. 16-19-00044 «Principles for the allocation of tasks between service robots and means of cyber-physical intelligent environment for the multimodal user support", 2016-2018.

Ronzhin, A. - 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. - RFBR Project No. 16-08-00696 «Modeling automated robotic means for transporting victims", 2016-2018.

Kulakov, F. - RFBR project No. 14-08-01225-a «Force-torque supervisory remote control of space robotic manipulators ", 2014-2016.

Panina, G. - RFBR Project No. 15-01-02021-a «Mechanical linkages: theory and applications», 2015-2016.

Ronzhin, A. - RFBR Project No. 16-08-20334 «Organization project for the 13th International Symposium on Neural Networks", 2016.

Ronzhin, A. – Project No. 0073-2015-0001 «Group control of mobile robots in the intelligent space", Program of the Presidium I.40P "Current problems of robotics", 2015-2016. (Jointly with the Laboratory of Integrated Automation systems headed by Dr. Tech. Sci. Smirnov, A.V.).

Karpov, A. – Agreement No. 14.616.21.0056 “Research and development of audiovisual speech recognition system based on a microphone and a high-speed videocamera” in the framework of the Federal Target Program “Research and development in priority areas of scientific-technological complex of Russia for 2014 – 2020”, 2015-2016. (Jointly with the Laboratory of Speech and Multimodal Interfaces headed by Dr. Tech. Sci. Karpov, A.A.).

University Courses

SPSUAI: “Neural network and expert systems”; “Methods of artificial intelligence”; “Robots and mechanotronic systems control”; Introduction to the speciality “Management in Technical Systems” (A. Ronzhin).

SPSU: “Mathematical Logic”, “Introduction to the Artificial Intelligence”, “Logic-objective approach to the Artificial Intelligence problems solving”, “Combinatorial geometry”, “Smooth manifolds” (G. Panina); “Fundamentals of control of robot and mechatronic systems” (F. Kulakov).

Physical-mathematical club at Steklov Institute: “Morse theory”, “Geometry and combinatorics” (G. Panina).

Summer school “Contemporary mathematics”, Dubna: “Discrete Morse theory” (G. Panina).

Conferences

First Military-Scientific Conference "Robotics for the Armed Forces of the Russian Federation", February10, 2016, Moscow – Ronzhin, A.

IX All-Russian Scientific-Practical Conference "Geographically Distributed Security Systems", April 5-7, 2016 Kaliningrad – Ronzhin, A.

The 11th Scientific-Practical Conference "Advanced Systems and Control Problems", April 5-9, 2016, Simferopol – Ronzhin, A

Scientific-Technical Conference "Zavalishinskie Chteniia - 2016", April 18-22, 2016, St. Petersburg – Denisov, A., Bizin, M., Kodyakov, A., Pavlyuk, N.

IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC 2016), May 4-6, 2016, Braganza, Portugal – Savelyev, A.

III All-Russian Forum of Young Scientists U-NOVUS, May 11-13, 2016, Tomsk – Ronzhin, A., Ivin, A., Mihalchenko, D.

First International Scientific Conference "Intelligent Information Technologies for Industry" (IITI'16), May 16-21, 2016, Sochi – Motienko, A.

XXIX International Scientific Conference "Mathematical Methods in Engineering and Technology", May 31 - June 3, 2016, St. Petersburg – Ronzhin, A. Vatamanyuk, I., Denisov, A., Pavlyuk, N., Motienko, A., Savelyev, A.

Geometric Rigidity Theory and Applications, May 30 - June 3, 2016 -Edinburg, United Kingdom – Panina, G.

International Conference on Power, Energy and Mechanical Engineering (ICPEME 2016), June 18-20, 2016, Bangkok, Thailand – Ronzhin, A.

13th International Symposium on Neural Networks (ISNN 2016), July 6-8, 2016, St. Petersburg – Budkov, V.

18th International Conference on Human-Computer Interaction (HCII 2016), July 17-22, 2016, Toronto, Canada – Ronzhin, A.

Student School "Contemporary Mathematics", July 19-29, 2016, Dubna – Panina, G.

18th International Conference “Speech and Computer”. SPECOM-2016. August 23-27, 2016, Budapest, Hungary – Budkov, V. Ronzhin, A., Pavlyuk, N.

1st International Conference “Interactive Collaborative Robotics”. ICR- 2016, August 23-25, 2016, Budapest, Hungary – Ronzhin, A., Pavlyuk, N.

Army Forum 2016 Conference "Fundamental Science-Army". September 8, 2016, Kubinka – Dashevskii, V.P.

Forum Army 2016 Round Table "Achievement of academic science in dual-use robotic systems development", September 10, 2016, Kubinka – Ronzhin, A., Dashevskii, V.

2016 International Conference and Exposition on Electrical and Power Engineering - EPE 2016, October 20-22, 2016, Iasi, Romania – Pavlyuk, N.

2016 World Robot Contest - RoboCup Challenges and Workshop, October 20-24, 2016, Beijing, China – Ronzhin, A.

27-th International Scientific and Technical Conference "Extreme Robotics (ER-2016)", November 24-25, 2016, St. Petersburg – Kulakov, F., Pavlyuk, N.

III All-Russian Scientific and Practical Conference "Modern Information Technologies. Theory and Practice ", November 30, 2016, Cherepovets – Pavlyuk, N.

VIII All-Russian Scientific Conference with international participation "Robotics and Artificial Intelligence" (IIM-16), November 25, 2016, Zheleznogorsk – Budkov, V.

International Robotics Competition Robotex 2016. Educational conference "New Educational Models for the 21st Century School", December 3-4, 2016, Tallinn, Estonia – Ronzhin, A.

Research management

Organization of the 18th International Conference "Speech and Computer” SPECOM-2016. http://specom.nw.ru/. Budapest (Hungary), August 23-27, 2016 – Ronzhin, A. (co-chair), http://specom.nw.ru/. Proceedings published: Speech and Computer. Springer International Publishing Switzerland. A. Ronzhin et al. (Eds.): SPECOM 2016, LNAI 9811, 2016, 746 p. http://link.springer.com/book/10.1007/978-3-319-43958-7.

Organization of the 1st International Conference "Interactive Collaborative Robotics” ICR-2016. http://specom.nw.ru/icr. Budapest (Hungary), August 23-27, 2016 – Ronzhin, A. (co-chair), http://specom.nw.ru/, Proceedings published: Interactive Collaborative Robotics - Springer International Publishing Switzerland. A. Ronzhin et al. (Eds.): ICR-2016, LNAI 9812, 2016, 262 p. http://link.springer.com/book/10.1007/978-3-319-43955-6.

Organization of the 13th International Symposium on Neural Networks (ISNN 2016), July 6-8, 2016, St. Petersburg – Ronzhin, A. (co-editor), Proceedings published: http://link.springer.com/book/10.1007/978-3-319-40663-3.

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, 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.

Panina, G.Yu. – Member of the St. Petersburg Mathematical Society, reviewer of Zentrallblatt.

Intellectual Property Registered in the Reporting Year

The patent for the invention No. 2597498 of 31.03.2015: Ronzhin, A.L., Karpov, A.A. "Speech recognition technique based on a two-level morphophonemic prefix graph."

Recent Results

1. We have designed kinematic and structural diagrams of the basic structural elements of the lower limbs of the anthropomorphic robot Antares. In the knee of the latter a two-motor layout is used, which provides more power and a larger angle of bending of legs; independent interaction with neighboring joints of the upper and lower legs when bending; the minimum displacement of the center of masses for simple movements. Experimental evaluation of the models allowed us to determine the required values of torques for servomotors and their maximum allowable values under the influence of various types of loads (twisting, fracture) [1, 15].

2. We have designed a new system-on module, which is characterized by the use of an external real-time microchip; an independent power supply system; low cost and a small size (82 * 50 * 5 mm); low power consumption (2-3 W); the processor frequency of up to 1000 MHz; RAM memory DDR3 of up to 1024 Mb; non-volatile random-access memory of up to 8GB. It supports external interfaces of peripheral devices (USB, UART, ADC, GPIO, Ethernet and others.) and is intended for the processing of sensory information and control of activation devices in embedded systems and mobile robotic complexes [19, 31].
3. We have developed software and hardware for the controller of model servos, which provide access to information on the rotor angle, consumed current, voltage, speed, and allow one to change the law for actuator regulation (e.g. the parameters of the PID controller) to improve the dynamic characteristics. This has been experimentally confirmed during performance of the network of controlled actuators in electromechanical modular elements of the anthropomorphic robot Antares being developed [43].
4. We have proposed the architecture for multimodal information and navigation cloud system “MINCS” for the corporate cyber-physical intelligent environment. It includes a plurality of interconnected services for user authentication, corporate television, visitor navigation, videoconferencing, sensory information processing. It operates according to the scenarios of interaction with users and providing security at the enterprise by integrating heterogeneous infrastructure components (information screens, turnstiles, video surveillance cameras and other proximity sensors, network and computing resources) [18].
5. We have developed a method for detecting objects of the environment on the basis of a multi-threaded digital media processing by a multisensory vision system and edge detection algorithms. The method is intended for the creation of 3D model of a recognized object and is characterized by a high degree of scalability of parallel algorithms and the use of fast binary comparison operations. The system prototype has been experimentally verified at performing image analysis tasks and a subsequent drawing of the contour of the object by a manipulation robot [45].

Awards

Budkov, V., Savelyev, A., Gaponov, V. - Certificate for the II place in the IoT-Hackathon, July 30-31, 2016 Moscow, Intel.

Budkov, V.Y. – Grant of the President of the Russian Federation No. MK-7925.2016.9 “Mathematical support and software for evaluating speech truthfulness in a speech flow”, 2016-2017.

Ronzhin, Al. L. – Scholarship of the President of the Russian Federation No. SP-3872.2015.5 “Development of the mathematical support and software for automation of audiovisual data processing aimed at maintaining events in intelligent room”, 2015-2018.

Ronzhin, A. L. - Winner of the contest for the Government of St. Petersburg prize in the field of scientific and educational activities in 2016.

References

Papers Published in Editions Indexed by WoS, Scopus

1. Pavluk, N., Denisov, A., Kodyakov, A., Ronzhin, A. Mechanical Engineering of Leg Joints of Anthropomorphic Robot // International Conference on Power, Energy and Mechanical Engineering 2016, MATEC Web of Conferences, 77, art. No. 04006.
2. Khimshiashvili, G., Panina, G., Siersma, D. Equilibria of three constrained point charges. Journal of Geometry and Physics. Vol. 106. 2016. pp. 42–50.
3. Solyonyj, S., Solenaya, O., Roznhin, A. Automatic System of Monitoring and Diagnostics of Sparking in Contact // International Conference on Power, Energy and Mechanical Engineering 2016, MATEC Web of Conferences, 77, art. No. 12003.
4. Ronzhin, A.L., Basov, O.O., Motienko, A.I., Karpov, A.A., Mikhailov Yu.V., Zelezny M. Multimodal information coding system for wearable devices of advanced uniform. Human Interface and the Management of Information: Information, Design and Interaction. Springer International Publishing Switzerland. 2016. Vol. 9734, LNCS, pp. 539-545.
5. Saitov, I.A., Basov, O.O., Motienko, A.I., Saitov, S.I., Bizin, M.M., Budkov, V.Yu. Neural Network System for Monitoring State of a High-Speed Fiber-Optical Linear Path. Advances in Neural Networks – ISNN 2016. Vol. 9719, LNCS. Springer International Publishing Switzerland. 2016. pp. 497-504.
6. Pavluk, N., Ivin, A., Budkov, V., Kodyakov, A., Ronzhin, A. Mechanical Leg Design of the Anthropomorphic Robot Antares // Interactive Collaborative Robotics, First International Conference ICR 2016, Budapest, Hungary, August 24–26, 2016, Springer International Publishing, 2016. LNAI 9812. pp. 113-123.
7. Motienko, A., Dorozhko, I., Tarasov, A., Basov, O. Proactive Robotic Systems for Effective Rescuing Sufferers // Interactive Collaborative Robotics, First International Conference ICR 2016, Budapest, Hungary, August 24–26, 2016, Springer International Publishing, 2016. LNAI 9812. pp. 172-180.

8. Ronzhin, A., Saveliev, A., Basov, O., Solyonyj, S. Conceptual Model of Cyberphysical Environment Based on Collaborative Work of Distributed Means and Mobile Robots // Interactive Collaborative Robotics, First International Conference ICR 2016, Budapest, Hungary, August 24–26, 2016, Springer International Publishing, 2016. LNAI 9812. pp. 32-39.
9. Denisov, A., Budkov, V., Mikhalchenko, D., Designing Simulation Model of Humanoid Robot to Study Servo Control System // Interactive Collaborative Robotics, First International Conference ICR 2016, Budapest, Hungary, August 24–26, 2016, Springer International Publishing. 2016. LNAI 9812. pp. 70-79.
10. Budkov, V., Vatamaniuk, I., Basov, V., Volf, D. Investigation of Speech Signal Parameters Reflecting the Truth of Transmitted Information // Speech and Computer, 18th International Conference SPECOM 2016, Budapest, Hungary, August 23–27, 2016, Springer International Publishing, 2016. LNAI 9811. pp. 419-426.
11. Vatamaniuk, I., Levonevskiy, D., Saveliev, A., Denisov, A. Scenarios of Multimodal Information Navigation Services for Users in Cyberphysical Environment // Speech and Computer, 18 International Conference SPECOM 2016, Budapest, Hungary, August 23–27, 2016, Springer International Publishing, 2016. LNAI 9811. pp. 588-595.
12. Motienko, A.I., Ronzhin, A.L., Basov, O.O., Zelezny, M. Modeling of Injured Position During Transportation Based on Bayesian Belief Networks. Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16), Advances in Intelligent Systems and Computing, Vol. 451. 2016. pp. 81-88.
13. Vatamaniuk, I., Panina, G., Saveliev, A., Ronzhin, A. Convex Shape Generation by Robotic Swarm // IEEE 2016 International Conference on Autonomous Robot Systems and Competitions, 2016, pp. 306-310.
14. Andrey Ronzhin, Irina Vatamaniuk, Nikita Pavliuk. Automatic Control of Robotic Swarm during Convex Shape Generation // 2016 International conference and exposition on electrical and power engineering, Romania, Iasi, October 20-22, 2016, index 926.

Papers published in Russian editions indexed by RSCI

15. Pavliuk, N.A., Budkov, V.Ju., Bizin, M.M., Ronzhin, A.L. Design Engineering of a Leg Joint of the Anthropomorphic Robot Antares based on a Two-Motor Knee // Izvestiya SFedU. Engineering Sciences. 2016. Vol. 1(174). pp. 227-239.

16. Motienko, A.I., Tarasov, A.G., Dorozhko, I.V., Basov, O.O. Proactive Control of Robotic Systems for Rescue Operations // SPIIRAS Proceedings. 2016. Vol. 46. pp. 174–195.
17. Ronzhin, A.L., Basov, O.O., Sokolov, B.V., Yusupov, R.M. Conceptual and Formal Models of Synthesis of Cyber-Physical Systems and Cyber-Physical Intellectual Spaces // Izv. Vuzov. Priborostroenie. 2016. Vol. 59, No. 11. pp. 897—905.
18. Levonevskiy, D.K., Vatamaniuk ,I.V., Saveliev, A.I., Denisov, A.V. Corporate information system of user service as a component of cyber-physical intellectual space // Izv. Vuzov. Priborostroenie. 2016. Vol. 59, No. 11. pp. 906—912.
19. Gaponov, V.S., Dashevsky, V.P., Bizin, M.M. Upgrading the firmware of model servos for use in anthropomorphic robotic systems // Doklady TUSUR. 2016. Vol. 19. No. 2. pp. 41–50.
20. Budkov, V.Yu., Saveliev, A.I., Volf, D.A. Technique for studying speech signal parameters reflecting the truth of the transmitted information // Doklady TUSUR. 2016. Vol. 19. No. 2. pp. 56–60.
21. Motienko, A.I. Planning Tactical Motion Trajectories of Automated Robotic Means During Disaster Relief // Nauchnyj Vestnik BelGU. 2016. Vol. 37. No. 2 (223). pp. 139-144.
22. Polyakov, A. V., Dashevsky, V.P., Karpov, A.A., Kryuchkov, B.I., Usov, V.M. Application of FRID Technologies for Information Support of Cosmonauts aboard Manned Spacecraft When Using Medical Packs and First Aid Kits. 2016. Vol. 18. No.1. pp. 104-117.
23. Kulakov, F.M. Remote control of space robots // Journal of Computer and Systems Sciences International. 2016. Vol. 55. No. 4. pp. 635-682.
24. Ronzhin, A.L., Vatamanyuk, I.V., Stankevich, L.A., Shlyakhov, N.E. On the methods of contact linking of a group of modular robots // Robotics and Technical Cybernetics. 2016. No. 3 (12). pp. 34-41.
25. Bizin, M.M., Denisov, A.V., Kodyakov, A.A., Pavlyuk, N.A., Stankevich, L.A. Pedipulators of the Anthropomorphic Robot Antares with Twin-Motor Knee Assembly and Two-Segment Foot // Robotics and Technical Cybernetics 2016. No. 4 (13). pp. 71-78.
26. Kulakov, F.M. Master-slave and supervisory control of robots with a large delay of the control signals and feedback. Part I // Robotics and Technical Cybernetics. No. 1(10), 2016. pp. 55-61.
27. Kulakov, F.M. Master-slave and supervisory control of robots with a large delay of the control signals and feedback. Part 2 // Robotics and Technical Cybernetics. 2016. No. 2 (11). pp. 29-38.

28. Motienko, A.I. Basov, O.O., Ronzhin, A.L. Distribution of tasks between the elements of a robotic rescue system // Proceedings of the XXIX International Conference Mathematical Methods in Engineering and Technology, St. Petersburg. 2016. Vol. 9. pp. 134-138.
29. Ronzhin, A.L., Bizin, M.M., Solyony, S.V. Mathematical models and means of multimodal interaction with robotic and cyber-physical systems // Proceedings of the XXIX International Conference Mathematical Methods in in Engineering and Technology, St. Petersburg, 2016. Vol. 8. pp. 107-111.
30. Shlyakhov, N.E., Savelyev, A.I., Ronzhin, A.L. Classification of ways to connect modular robots // Proceedings of the 9th Conference "Information Technologies in Management (ITM-2016)", St. Petersburg. 2016. pp. 288-292.
31. Gaponov, V.S., Dashevskii, V.P., Bizin, M.M., Development of compact servo controllers for robot systems. Proceedings of the 9th Conference "Information Technologies in Control", St. Petersburg, 2016. pp. 288-292.
32. Vatamanyuk, I.V. Algorithm for assigning robotic swarm trajectories with resolution of occurring collisions // Proceedings of the XXIX International Conference Mathematical Methods in Engineering and Technology, St. Petersburg. 2016. Vol. 8. pp. 112-116.
33. Pavlyuk, N.A., Bizin, M.M. Constructive solutions for the anthropomorphic robot Antares // Proceedings of the XXIX International Conference Mathematical Methods in in Engineering and Technology, St. Petersburg, 2016. Vol. 9. pp. 138-142.
34. Denisov A.V., Development of a simulation model of an anthropomorphic robot // Proceedings of the XXIX International Conference Mathematical Methods in technology, St. Petersburg. 2016. Vol. 9. pp. 142-146.
35. Denisov, A.V. Modeling of the system for anthropomorphic robot gait control in MATLAB / Simulink // Proceedings of the 9th Conference "Information Technologies in Management" (ITM-2016), St. Petersburg, Russia. 2016. pp. 152-157.

Other Publications

36. Motienko, A.I., Basov, O.O., Ronzhin, A.L. Automated robotic means for transporting victims// Proceedings of the First Military-Scientific Conference "Robotics of the Armed Forces." Moscow. 2016. pp. 242-248.
37. Kalinin, V.N., Ohtilev, M.Yu., Sokolov, B.V., Basov, O.O., Vatamanyuk, I.V., Ronzhin, A.L. Theoretical and applied aspects of

management of the structural dynamics of robotic systems // Proceedings of the First Military-Scientific Conference "Robotics of the Armed Forces." Moscow, 2016. pp. 369-373.
38. Motienko, A.I., Basov, O.O., Dorozhko, I.V., Tarasov, A.G. Knowledge representation in rescue robotics systems based on Bayesian belief networks // Proceedings of the All-Russian scientific-practical conference "Problems of the creation and use of small spacecraft and robotic vehicles for the Armed Forces of the Russian Federation." St. Petersburg, 2016. pp. 469-474.
39. Kryuchkov, B.I., Dashevskiy, V.P., Karpov, A.A., Polyakov, A.V., Usov, V.M. Information support of astronauts in manned complexes based on RFID technology for identification of property, goods and materials supplied. Proceedings of the International Conference "Human space exploration» (IAA Conference «Human Space Exploration-2016"), Korolev, Russia. 2016. pp. 185-186.
40. Pavlyuk, N., Kodyakov, A. Determining optimal components in the design of an anthropomorphic robot // Collection of reports: Zavalishinskie Chteniia. 2016. pp. 56-62.
41. Pavlyuk, N.A., Ronzhin, A.L. Constructive solutions for the lower limbs of the anthropomorphic robot Antares // Proceedings of the International Scientific and Technical Conference "Extreme Robotics". 2016. pp. 422-427.
42. Kulakov, F.M. Methods for the organization of the ground control complex for remote-controlled space robots // Proceedings of the International Scientific and Technical Conference "Extreme Robotics". 2016. pp. 81-86.
43. Gorbunov, V.I., Kulakov, F.M. Vision System for remote controlled space robots // Proceedings of the International Scientific and Technical Conference "Extreme Robotics". 2016. pp. 277-280.
44. Shcherbakov, A.A., Denisov, A.V. Development of the architecture of software complex for operation emulation of the robot manipulator // Proceedings of the Scientific and Technical Conference "Zavalishinskie Chteniia - 2016", St. Petersburg. 2016. pp. 170-177.
45. Polyakov, A.V., Dashevskiy, V.P., Usov, V.M. Using RFID-technologies for a rapid search of medicines in a manned space flight // Aerospace and Environmental Medicine. 2016. No. 5. pp. 174-175.

Laboratory of Biomedical Informatics

Head of Laboratory: Dr. Tech. Sci. Sergey B. Roudnitsky – distance biometry, chronobiology, integrated signal processing, radionavigation. roudnitsky@spiiras.nw.ru

Laboratory Staff – 8 members.

Research Activities

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

Research Fellows and Summary of Research Topics

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

Leading Researcher, Dr. Tech. Sci. Assoc. Prof. – Senkevich, Y.I. – development and production of medical information systems for core organisations. senkevich@spiiras.nw.ru

Senior Researcher PhD – Popova, E.A. – development of mathematical models; numerical experiments in biotechnical systems. eap@spiiras.ru

Senior Researcher, PhD (Med.) – Wasserman, E.L. – research of human brain electric activity; design of psychophysiological testing systems; polygraphy; medical informatics as an academic discipline. ewasser@ev7987.spb.edu

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

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

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

Grants and projects

RAS program III.3 NITD RAS. Project “Fundamental basis of designing and employment of socio-cyber-physical systems based on ubiquitous

computing technologies, communications and multimodal user interfaces". Project section: "Mathematical analysis of the results of dichotic speech tests under the condition of a limited number of samples".

University courses

Herzen State Pedagogical University of Russia, Department of Information Systems and Software: "Intellectual Information Systems" – Prof. V.A. Duke

Herzen State Pedagogical University of Russia, Institute of Special Education and Rehabilitation, Department of Foundations for Special Education: "Information Technology in Psychological and Educational Rehabilitation of Disabled People", "Child Neurology", "Psychopathology with a Clinical Picture of Intellectual Disorders" – Assoc. Prof. E.L. Wasserman.

St. Petersburg State University, Department of Healthcare Management: "Informatics", "Medical Informatics" – Assoc. Prof. E.L. Wasserman.

Conferences

X international scientific conference "Systems analysis in medicine" (SAM 2016), Blagoveshchensk, September 22-23, 2016 — Wasserman, E.L., Kartashev, N.K., Popova, E.A.

2016 IEEE 10th International Conference on Application of Information and Communication Technologies (AICT), October 12-14, 2016, Baku, Azerbaijan. — Wasserman, E.L., Kartashev, N.K., Popova, E.A.

9th Conference "Information technologies in management" (ITM-2016), St. Petersburg, October 4-6, 2016 – Zhvalevsky, O.V.

XV Jubilee St. Petersburg International Conference "Regional Informatics" (RI-2016), St. Petersburg, October 26-28, 2016 – Denisova, D.M., Duke, V.A., Zhvalevsky, O.V.

VI International Conference "Mathematical Biology and Bioinformatics", Pushchino, October 16-21, 2016 – Duke, V.A.

All-Russian Scientific Conference "Procedures and methods of experimental psychological research", Moscow, November 23-25, 2016 – Duke V.A.

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

Sergey B. Roudnitsky – RAS expert (ID No. 2016-01-2675-2205); expert on applications and report materials 2016 FTP R&D 14-20 FSFSI

“Directorate of STP” of the RF Ministry of Education and Science; member of thesis committee DS 409.016.01 at All-Russian Research Institute of Radio Equipment, reviewer at Proceedings of SPIIRAS.

Vacheslav A. Duke – editorial board member of theoretical and practical journal “Clinical and Laboratory Council”, member of the board of administration of the regional department of the Russian Association of Medical Laboratory Diagnostics, member of St. Petersburg State University dissertation council.

Yuri I. Senkevich – member of the “Biotechnosphere” journal editorial board, member of SPIIRAS dissertation council.

Recent Research Results

1. Mathematical models of dichotic listening of speech procedures have been developed. The models are useful for predicting the behavior of laterality index and estimating the statistical significance of results obtained at each step. Methods for minimizing the number of stimulus presentations required for an expert to make a reliable decision have been proposed [1,4].
2. Scientific basis has been developed for employing the method of structural resonance (SR) for solving the fundamental problem of discovering the patterns of chemical structures and structure-activity relationships (SAR). The unique capabilities of the SR method for finding strong and complex logical associations in multidimensional data as well as its ability to analyze Big Data allow to use known descriptor systems of chemical compounds in a new way, operate the new descriptor systems and create high-precision SAR models. It has been shown that, compared to rivaling solutions, the SR method shows higher precision and output as well as interpretability of the results that allows to carry out targeted design of pharmaceutical preparations [2,6–8].
3. Flexible architecture for software & hardware systems (SHS) for performing physiological research has been suggested [3]. Modular software for keeping the base of experimental data, recording physiological indices and human behavioral reactions and performing mathematical analysis of physiological signals has been developed on the basis of the suggested architecture. The SHS’s software operates on the basis of three scenario types: hardware configuration scenarios that describe the structure of experimental data; scenarios of recording physiological indices that describe the course of performing measurement-based experiments and the details of their realization; and scenarios of processing the experimental data with available packages of application

subprograms. The further realization of the suggested approach is aimed at creating sufficiently universal research software.

4. A plan of experimental data storage arrangement optimized for the use of algorithms for mathematical processing of experimental data has been suggested and approbated [5]. The suggested plan is based on keeping special sections, each designed for a certain kind of processing, and constitutes a hierarchy of catalogs. Each level of the hierarchy corresponds with a certain type of processable data, the sequence of sections allows for the realization of complex multi-stage processing while the catalog hierarchy enables the realization of various calculation options and explore different approaches to experimental data processing.

5. Basic aspects related to the modification of the AFD (analysis of fractal dynamics) method for processing tensotremorograms have been studied. [9] A method has been suggested for determining the optimal values of control parameters of the modified method's algorithm. The recognition network based on the use of the modified AFD method has been described. Special attention has been paid to the criterion of recognition quality and the role of the newly-introduced "joker" class "I don't know" (which stands for refusal to recognize) and the class of "unknown objects" (a group of objects assigned to the unknown class upon recognition) in the recognition network.

6. Research on the influence of Internet surveillance on the psychophysiological state of Internet users has been analyzed. Results suggest a link between the level of social welfare and the priority level of online privacy in a person's hierarchy of needs. The concept of online privacy is related to needs such as belonging, esteem and self-actualization. Therefore, it becomes relevant when the basic, survival-related needs are met. The frustration of higher level needs caused by Internet surveillance has negative psychophysiological consequences as well as prevents people from accessing social coping resources [10].

References

Papers Published in Editions Indexed by WoS, Scopus

1. Popova, E., Wasserman, E., Kartashev, N. Dichotic Listening Test in case of Small Stimulus Set: Random Walk and Sequential Wald Analysis. // 2016 IEEE 10th International Conference on Application of Information and Communication Technologies (AICT), October 12-14, 2016, Baku, Azerbaijan: Conference proceedings — Baku: Qafqaz University, 2016. — pp. 793—795.

2. 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. St. Petersburg, Eskulap, 2016. (in press).
3. Wasserman, E.L., Kartashev, N.K., Zhvalevsk,y O.V., Rudnitsky, S.B. Flexible architecture of software & hardware systems for physiological research // Izvestiya vysshikh uchebnykh zavedeniy. Priborostroenie. 2016. V. 59, No. 11. pp. 952—958. DOI 10.17586/0021-3454-2016-59-11-952-958

Papers Published in Russian Editions Indexed by RSCI

4. Popova, E.A., Wasserman, E.L., Kartashev, N.K. Determining the necessary sample size for dichotic listening of speech: two approaches // Proceedings of X international scientific conference “Systems analysis in medicine” (SAM 2016). 2016. pp. 17–20.
5. Zhvalevsky, O.V. Experimental data base control system // Proceedings of IX conference “Information technologies in management” (ITM-2016). St. Petersburg, AO “Kontsern “TsNII Elektropribor””, 2016. pp. 565–573.
6. Duke, V.A., Senkevich, Yu.I. Employment of the data mining of electroencephalographic measurements for revealing the subliminal visual influence on humans // Protsedury i metody eksperimental'nopsikhologicheskikh issledovaniy. Series: Integratsiya akademicheskoy i universitetskoy psikhologii. Moscow, Institut psikhologii RAN, 2016. pp. 332-339.
7. Duke, V.A. Problems and prospects of mathematical methods of predicting the biological activity properties of chemical compounds // Mathematical biology and bioinformatics: Reports of VI International conference. Pushchino, 2016. pp. 74-76.
8. Duke, V.A., Senkevich, Yu.I. On the possibility of creating a keypoard-based polygraph // Biotekhnosfera, 2016 (in press).

Other publications

9. Zhvalevsky, O.V. Method of analysis of fractal dynamics and its application to the processing of tensotremorograms // XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016. St. Petersburg, SPOISU, 2016. pp. 401
10. Denisova, D.M. The effect of Internet surveillance on the psychophysiological wellbeing of Internet users // XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016 St. Petersburg, SPOISU, 2016. pp. 400.

Laboratory of Computer Aided Integrated Systems

Head of the Laboratory: Dr.Habil. PhD Honored Scientist of the Russian Federation Prof. 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 PhD student.

Research Activities

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

Research Fellows

Senior Researcher PhD – Alexey M. Kashevnik – methods and technologies for knowledge management in intelligent environments. alexey@iias.spb.su

Senior Researcher PhD – Tatiana V. Levashova – methods and technologies for ontology management. tatiana.levashova@iias.spb.su

Senior Researcher PhD – Michael P. Pashkin – Internet-based technologies for group decision support. michael@iias.spb.su

Researcher PhD – Andrew V. Ponomarev – methods and technologies for complex decision support. ponomarev@iias.spb.su

Senior Researcher PhD – Sergey V. Savosin – methods and information technologies for business process management.

Senior Researcher PhD Assoc. Prof. – Nikolai G. Shilov – models and methods for networked organization configuration. nick@iias.spb.su

Senior Researcher PhD – Vladimir M. Shpakov - hybrid dynamic system modelling and simulation. vlad@iias.spb.su

Senior Researcher PhD – Nikolai N. Teslya – technologies for smart spaces. teslya@iias.spb.su

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

Defense of Theses

Mingina, Y.G. - Development of the Recommendation Generation Mechanism for Trip Planning Based on the Collaborative Filtering, Master Degree, 09.04.02 – Information Systems and Technologies (St.Petersburg State Electrotechnical University "LETI", supervisor - N. Shilov, PhD).

Sekun, E.S. - Development of the Model of Context-Dependent Decisions for Public Transport Trip Planning, Master Degree, 09.04.02 – Information Systems and Technologies (St.Petersburg State Electrotechnical University "LETI", supervisor - N. Shilov, PhD).

Shpyrkov, A.A. - Development of the User Clustering Based on Their Decisions, Master Degree, 09.04.02 – Information Systems and Technologies (St.Petersburg State Electrotechnical University "LETI", supervisor - N. Shilov, PhD).

Afzali, B.T. - Development of Architecture and Information Environment for Information Interaction Support of User and Smart Home Devices, Master Degree, 09.04.03 - Applied Informatics (ITMO University, supervisor - A. Kashevnik, PhD)

Grants and Projects

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).

Smirnov, A. – Development of a Methodology and Models for Configuration of Dynamic Resource Networks in Smart Spaces for Users Support (the Russian Foundation for Basic Research, 2014-2016 - Grant No. 14-07-00345).

Levashova, T. – Development of a Methodology and Models for Design of Context-aware Decision Support Systems based on Knowledge Integration Patterns (the Russian Foundation for Basic Research, 2014-2016 - Grant No. 114-07-00427).

Savosin, S. – Development of Logic-Dynamic Based Methods for Intelligent Decision Support in Diagnosis & Management of Dynamical Systems (the Russian Foundation for Basic Research, 2014-2016 - Grant No. 14-07-00363).

Shilov, N. – Development of Semantic Models for Business Processes Integration Based on Web-Services in Flexible Supply Networks (the Russian Foundation for Basic Research, 2014-2016 - Grant No. 14-07-00378, 2014-2016).

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).

University Courses

SPSEEU, Department of Research Automation: Intelligent Data Analysis (Assoc. Prof. N. Shilov), Knowledge Engineering (Assoc. Prof. N. Shilov).

Conferences

The 11th All-Russian Conference on Methodological Problems of Macro-System Management, Apatiti, Russia, March 26 – April 3, 2016. – Smirnov, A.

The 18th Conference of Open Innovations Associations FRUCT (FRUCT 18th), St.Petrsburg, Russia, April 18 – 22, 2016. – Kashevnik, A., Ponomarev, A., Teslya, N., Shchekotov, M.

The 2nd International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS 2016), Rome, Italy, April 23 – 24, 2016. – Smirnov, A.

The 18th International Conference on Enterprise Information Systems, (ICEIS 2016), Rome, Italy, April 25 – 28, 2016. – Smirnov, A.

First International Scientific Conference "Intelligent Information Technologies for Industry" (IITI'16), Sochi, Russia, May 16 – 20, 2016. – Smirnov, A. *(plenary talk, best paper award)*

The 23rd CIRP Conference on Life Cycle Engineering (CIRP LCE 2016), Berlin, Germany, May 22 – 24, 2016. – Smirnov, A.

The 11th System of Systems Engineering Conference (SoSE16), Kongsberg, Norway, June 12 – 16, 2016. – Smirnov, A.

The 19th International Conference on Business Information Systems (BIS 2016), Leipzig, Germany, July 6 - 8, 2016. – Smirnov, A., Shilov, N.

The 18th International Conference on Speech and Computer (SPECOM 2016), Budapest, Hungary, August 24 – 26, 2016. – Kashevnik A.

The First International Conference on Interactive Collaborative Robotics
(ICR 2016), Budapest, Hungary, August 24 – 26, 2016. – Kashevnik, A.

The Intelligent Systems and Technologies Conference (IS-IT'16), Divnomorskoe, Russia, September 2-9, 2016. – Smirnov, A.

The 16th International Conference NEW2AN 2016 and 9th Conference ruSMART 2016 (RUSmart 2016), St.Petersburg, Russia, September 26 – 28, 2016. – Shilov, N.

The 19th Conference of Open Innovations Associations FRUCT (FRUCT'19), Jyvaskyla, Finland, November 7 – 11, 2016. – Smirnov, A., Kashevnik, A., Teslya, N., Shchekotov, M.

The 18th International Conference on Information Integration and Web-based Applications & Services (iiWAS2016), Singapore, November 28-30, 2016. – 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; expert of European Commission (Directorate-General Information Society – Research; NEST, FET) and European Research Council (ERC); a member of technical committee of IFAC TC 5.1 on Manufacturing Plant Control; IEEE SMC TC on Cyber-Physical Cloud Systems, IFIP TC WG5.1 on Global Product Development for the Whole Life-Cycle; member of IEEE, honorary member of International Association "Institute for Systems and Technologies of Information, Control and Communication", and fellow of the European Academy of Industrial Management. A member of Advisory Committee & Editor Board of Journal on Information Technologies and Computer Systems (Russian Academy of Sciences, Russia); Journal on Artificial Intelligent and Decision Making (Russian Academy of Sciences, Russia); Journal of Information & Control Systems (Russia), Journal "SPIIRAS Proceedings" (Russia), International Journal of Multiagent and Grid Systems (IOS Press); International Transactions on Systems Science and Applications (Springer), International Journal of Data Analysis Techniques and Strategies (Inderscience Publishers), Management and Production Engineering Review (the Polish Academy of Sciences), International Journal of Product Lifecycle Management (Inderscience Publishers), Intelligent Industrial Systems (Springer).

Levashova, T. – member of Editor Board of Journal "Complex Systems Informatics and Modeling Quarterly" (RTU Press).

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

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

Ponomarev, A. – member of ACM.

Intellectual Property

An application for state registration of software program No. 2016661381 07/11/2016 «System for Collaborative Annotation of Images Large Collection", A. Ponomarev.

Recent Results

1. Technological foundations for decision support systems (DSSs) based on interaction of human-computer cloud services in ontology-oriented smart spaces via blackboard have been developed. Ontological description of components of the system – problem domain, problem context, service profiles, situations and tasks – allows to use logical inference to provide service interoperability and context-awareness. Service-oriented architecture of the DSSs has also been proposed. The architecture is based on interaction of human-computer cloud services and integrates software services and services represented by human experts using centralized as well as decentralized composition mechanisms [5 - 7, 16-18, 20, 28, 30, 35, 38].
2. Architecture and algorithms for decentralized recommendation services, based on structured peer-to-peer networks have been proposed. Their distinguishing feature is a combination of decentralization of recommendation service and limited disclosure of user preferences. The algorithm of recommendations is based on locality-sensitive hashing of users preferences. Limited disclosure is provided by an anonymization overlay on top of the peer-to-peer network. [4, 34].
3. An analysis of modern methods of development of context-aware recommendation services based on various principles (collaborative filtering, content-based, knowledge-based) has been conducted. During the analysis, most attention was paid to application areas and systems rich with context information and employing ontologies for context modeling and representation. Basic principles of accounting for context in recommendation services have been identified. These principles include: (a) employing the same formal methods for context and preferences representation; (b) hierarchical modeling of context, allowing generalization and concretization operations; (c) employing contextual pre-

filtering in collaborative filtering systems. [1, 3, 22, 23, 27, 31, 32, 37, 39, 40].

4. Models of the main elements of the infomobility support system have been developed: (1) the model of infomobility support system based on the “blackboard” architecture and ontological knowledge representation; (2) the ontological model of the context of the task at hand, with methods being implemented as computational services; (3) the ontological model of the user context consisting of information entered by the user (his/her profile) and environment information collected automatically; (4) ontological models of the services of the infomobility support system. [2, 8, 9, 11 – 14, 19, 29, 36].

5. An ontological model for self-organisation of a group of mobile robots based on the publish/subscribe mechanism has been developed. The ontological model consists of robot ontologies and task ontologies published in the smart space (SS). The robot ontology describes its competencies and constraints to be satisfied. When a task is published in the smart space, its ontology is matched with robot ontologies. Based on the matching results the robot or several robots are chosen for task solving. They start to solve the task and publish the result in the smart space. If another robot or robots meet the requirements of the updated task, they perform corresponding actions. This sequence is repeated until the task is solved completely [10, 15, 21, 24 - 26].

Awards

The paper «Context-Oriented Knowledge Management for Decision Support in Business Networks: Theoretical and Technological Foundations» by Smirnov A. has got “The best paper” award at the First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16), Sochi, Russia, May 16 – 20, 2016”.

References

Books

1. Shpakov, V. M. The Computer Implementation of Processes. Saarbrucken: Palmarium Academic Publishing, 2016. 244 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, 2016. pp. 1 - 15.
3. Smirnov, A., Ponomarev, A. Exploring Requirements for Multipurpose Crowd Computing Framework // Advances in Service-Oriented and Cloud Computing, G. Access, A. Celesti, P. Leitner (Ed.), The 4th European Conference on Service-Oriented and Cloud

Computing (ESOCC 2015), Taormina (Messina), Italy, Communications in Computer and Information Science, Springer, Heidelberg, Vol. 567, 2016. pp. 299 - 307.
4. Smirnov. A.V., Ponomarev. A.V. Locality-Sensitive Hashing for Distributed Privacy-Preserving Collaborative Filtering: An Approach and System Architecture // Lecture Notes in Business Information Processing - 2016, Vol. 241. pp. 455-475.
5. Smirnov. A., Levashova. T., Shilov. N., Kashevnik. A. Decision Support for Wide Area Disasters // Fusion Methodologies in Crisis Management,
G. Rogova, P. Scott (Eds.), Springer, Heidelberg, 2016, pp. 519 - 537.
6. Smirnov, A., Levashova, T., Shilov, N. Context-Aware Knowledge Fusion for Decision Support // Context-Enhanced Information Fusion, L. Snidaro, J. García, J. Llinas, E. Blasch (Eds.), Advances in Computer Vision and Pattern Recognition, Springer International Publishing Switzerland, Switzerland, 2016. pp. 125 - 154.
7. Smirnov, A., Shilov, N., Oroszi, A., Sinko, M., Krebs, T. Towards Life Cycle Management for Product and System Configurations: Required Improvements in Business Processes and Information Systems //Proceedings of 23rd CIRP Conference on Life Cycle Engineering
(CIRP LCE 2016), Berlin, Germany, Procedia CIRP, Elsevier, Vol. 48, 2016. pp. 84 - 89.
8. Smirnov, A., Kashevnik, A., Shilov, N. Driver Assistant in Automotive Socio- cyberphysical System: Reference Model and Case Study //
The 2nd International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS 2016), Rome, Italy, 2016. pp. 104 - 111.
9. Smirnov, A., Ponomarev, A., Kashevnik, A. Tourist Attraction Recommendation Service: An Approach, Architecture, and Case Study // Proceedings of the 18th International Conference on Enterprise Information Systems, (ICEIS 2016), Rome, Italy, 2016. pp. 251 - 261.
10. Kashevnik, A., Teslya, N., Yablochnikov, E., Arckhipov, V., Kipriyanov, K. Hybrid Automated Line Workstations Interaction Scenario for Optical Devices Assembly // Proceeding of the 18th Conference of Open Innovations Associations FRUCT, S. Balandin (Ed.), ITMO University, St.Petersburg, Russia, 2016. pp. 92 - 99.
11. Ponomarev, A. Recommending Tourist Locations Based on Data from Photo Sharing Service: Method and Algorithm // Proceeding

of the 18th Conference of Open Innovations Associations FRUCT, S. Balandin (Ed), ITMO University, St.Petersburg, Russia, 2016, pp. 272-278.
12. Smirnov, A., Kashevnik, A., Lashekov, I., Baraniuc, O., Parfenov, V. Smartphone-Based Identification Of Dangerous Driving Situations: Algorithms and Implementation // Proceeding of the 18th Conference of Open Innovations Associations FRUCT, S. Balandin (Ed.), ITMO University, St.Petersburg, Russia, 2016, pp. 306 - 313.
13. Smirnov, A., Teslya, N., Shilov, N., Kashevnik, A. Context-Based Trip Planning in Infomobility System for Public Transport // Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16), A. Abraham, S. Kovalev, V. Tarassov, V. Snášel (Eds.) Sochi, Russia, Advances in Intelligent Systems and Computing, Springer, Heidelberg, Vol. 450, Part 1, 2016, pp. 361 - 372.
14. Smirnov, A.V., Kashevnik, A.M., Lashkov, I. Human-Smartphone Interaction for Dangerous Situation Detection and Recommendation Generation while Driving // Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), Springer International Publishing Switzerland, 2016, Vol. 9811, pp. 346-353.
15. Smirnov, A., Kashevnik, A., Mikhailov, S., Mironov, M. Smart M3-Based Robot Interaction Scenario for Coalition Work // Interactive Collaborative Robotics, A. Ronzhin, G. Rigoll, R. Meshcheryakov (Eds.), Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), Springer International Publishing Switzerland, Vol. 9812, 2016. pp. 199 - 207.
16. Smirnov, A., Ponomarev, A., Sandkuhl, K. Crowdsourcing in Business Process Outsourcing: An Exploratory Study on Factors Influencing Decision Making // Perspectives in Business Information Research, Business Information Research (BIR), Prague, Czech Republic, Lecture Notes in Business Information Processing, Springer, Heidelberg, 2016, Vol. 261, pp. 33 - 49.
17. Grafkin, P., Mironov, M., Fellmann, M., Lantow, B., Sandkuhl, K., Smirnov, A. SPARQL Query Builders: Overview and Comparison SPARQL Query Builders: Overview and Comparison // BIR 2016 Workshops and Doctoral Consortium: Joint Proceedings of the BIR 2016 Workshops and Doctoral Consortium co-located with 15th International Conference on Perspectives in Business Informatics Research (BIR 2016), B. Johansson, F. Vencovský (Eds.), Prague,

Czech Republic, CEUR Workshop Proceedings, CEUR, Vol. 1684, 2016. pp. 1 - 12.
18. Smirnov, A., Kashevnik, A., Balandin, S. Competency Management System for Technopark Residents: Smart Space-Based Approach // Internet of Things, Smart Spaces, and Next Generation Networks and Systems; O. Galinina, S. Balandin, Y. Koucheryavy (Eds.), 16th International Conference NEW2AN 2016 and 9th Conference ruSMART 2016 (RUSmart 2016), St.Petersburg, Russia, Lecture Notes in Computer Science, Springer, Heidelberg, Vol. 9870, 2016. pp. 15 - 24.
19. Smirnov, A., Shilov, N., Gusikhin, O. “Connected Car”-Based Customised On-Demand Tours: the Concept and Underlying Technologies // Internet of Things, Smart Spaces, and Next Generation Networks and Systems,,O. Galinina, S. Balandin, Y. Koucheryavy (Eds.), 16th International Conference NEW2AN 2016 and 9th Conference ruSMART 2016 (RUSmart 2016), St.Petersburg, Russia, Lecture Notes in Computer Science, Springer, Heidelberg, Vol. 9870, 2016. pp. 131 - 140.
20. Hashimoto, N., Okuma, T., Miyakoshi, S., Tomita, K., Matsumoto, O., Smirnov, A., Kashevnik, A., Lashkov, I. Use Cases for Rider Assistant Mobile Application Evaluation Using Travelling Simulator // Proceedings of the 19th Conference of Open Innovations Associations FRUCT, S. Balandin, T. Tyutina (Eds.), Jyvaskyla, Finland, , ITMO University, 2016 , pp. 47 - 53.
21. Shchekotov, M. Automatic Calibration for Log-normal Path Loss Model Based on Bluetooth Low Energy Beacons // Proceedings of the 19th Conference of Open Innovations Associations FRUCT, S. Balandin, T. Tyutina (Ed,.), Jyvaskyla, Finland, ITMO University, 2016. pp. 212 - 218.
22. Smirnov, A., Ponomarev, A., Levashova, T., Teslya, N. Human-Computer Cloud for Decision Support in Tourism: Approach and Architecture // Proceedings of the 19th Conference of Open Innovations Associations FRUCT, S. Balandin, T. Tyutina (Ed,.), Jyvaskyla, Finland, ITMO University, 2016. pp. 226 - 235.
23. Teslya, N., Ponomarev, A. Smart Tourism Destination Support Scenario Based on Human-Computer Cloud // Proceedings of the 19th Conference of Open Innovations Associations FRUCT, S. Balandin, T. Tyutina (Ed.), Jyvaskyla, Finland, Conference of Open Innovation Association, FRUCT, ITMO University, 2016. pp. 242 - 247.

24. Viola, F., D'Elia ,A., Korzun, D., Galov, I., Kashevnik, A., Balandin, S. The M3 Architecture for Smart Spaces: Overview of Semantic Information Broker Implementations // Proceedings of the 19th Conference of Open Innovations Associations FRUCT, S. Balandin, T. Tyutina (Eds.), Jyvaskyla, Finland, Conference of Open Innovation Association, FRUCT, ITMO University, 2016. pp. 264 - 272.
25. Smirnov, A., Kashevnik, A., Mikhailov, S., Mironov, M., Petrov, M. Ontology-Based Collaboration in Multi-Robot System: Approach and Case Study // IEEE 11th System of Systems Engineering Conference (SoSE16), Kongsberg, Norway, 2016. pp. 1-12.
26. Kashevnik, A., Teslya, N., Yablochnikov, E., Arckhipov, V., Kipriyanov, K. Development of a Prototype Cyber Physical Production System with Help of Smart-M3 // The 42nd Annual Conference of IEEE Industrial Electronics Society (IECON2016), Piazza Adua, 1 - Firenze (Florence), Italy, 2016. pp. 1-12.
27. Smirnov, A., Ponomarev, A., Levashova, T., Teslya, N. Decision Support in Tourism Based on Human-Computer Cloud // Proceedings of the 18th International Conference on Information Integration and Web-based Applications & Services (iiWAS2016), 28-30 November 2016, Singapore. pp. 127-134
28. Smirnov, A., Shilov, N., Oroszi, A., Sinko, M., Krebs, T. From Products to Product-Service Systems: Business and Information System Changes // Business Information Systems Workshops, 19th International Conference on Business Information Systems (BIS 2016), Leipzig, Germany, Lecture Notes in Business Information Processing, Springer, Heidelberg, 2016. pp. 1-12.

Papers Published in Russian Editions Indexed by RSCI

29. Teslya, N.N. Individual Multimodal Trip Planning With Consideration of Public Transport Timetable // Khomonenko, A.D. (Ed.) Intellectual Technologies on Transport. St.Petersburg: Emperor Alexander I St.Petersburg State Transport University, Vol 2(6), 2016. pp. 16-21.
30. Levashova, T., Pashkin, M. Ontology-Based Approach to Configuring of Mobile Operator Products // Science Bulletin of NSTU, Novosibirsk: NSTU, Vol. 63, No.2, 2016. pp. 99 - 114.
31. Shpakov, V. M. The Computer Implementation of Processes Based on Their Logical-Dynamic Specification // Informatsionno-upravliaiushchie sistemy [Information and Control Systems], St.Petersburg: SUAI, Vol. 83, No.4. pp. 68-76.

32. Shpakov, V. M. The Use of Logic-Dynamic Processes Specification for the Computer Implementation of Dynamical Systems Physical Models // Physical Education in Universities, 2016, No.3. pp. 71-85.
33. Smirnov, A., Ponomarev, A. Crowd Computation for Decision Support. // Proceedings of Intelligent Systems and Technologies Conference (IS-IT'16), Moskow, Fizmatlit, 2016. Divnomorskoe, Russia, September 2-9, 2016, pp. 154 - 162.
34. Shilov, N., Ermolaev, V. Methodological Basis of Intelligent Support of Socio-Oriented Decisions in Flexible Transportation Systems // Science Bulletin of NSTU, Novosibirsk: NSTU, Vol. 64, No. 3, 2016. pp. 59 - 72.
35. Kashevnik, A., Baraniuc, O., Gordeev, B. Competence Management System for Technopark Residents // Informatsionno-upravliaiushchie sistemy [Information and Control Systems], St.Petersburg: SUAI, Vol. 83, No.4, 2016. pp. 10–18.
36. Shilov, N. The Methodology of Proactive Recommendation System Building for Infomobile Applications // Informatsionno-upravliaiushchie sistemy [Information and Control Systems], St.Petersburg: SUAI, Vol. 83, No.6, 2016. pp. 16 – 24.

Other Publications

37. Smirnov, A., Shilov, N., Gusikhin, O. Socio-Cyberphysical System for Parking Support // International Journal of Future Computer and Communication, Vol. 3, No. 1, 2016. pp. 27 - 32. (Google Scholar)
38. Gordeev, B., Baraniuc, O., Kashevnik, A. Web-Based Competency Management System for Technopark of ITMO University // Proceedings of the 18th FRUCT & ISPIT Conference, April 18-22, 2016, Technopark of ITMO University, St.Petersburg, Russia. pp. 463-466.
39. Teslya, N., TAIS Client Application Improvements and Optimization for Tablets // Proceedings of the 18th FRUCT & ISPIT Conference, April 18-22, 2016, Technopark of ITMO University, St.Petersburg, Russia, pp. 628-629.
40. Smirnov, A., Ponomarev, A. Decision Support Based on Growd Computation: Approach and Platform Architecture // Proceedings of The 11th All-Russian Conference on Methodological Problems of Macro-System Management, Apatity, Russia, 2016. pp. 73 - 75.

Laboratory of Information Technologies in System Analysis and Modeling

Head of Laboratory: Dr. Tech. Sci., Honored Scientist of the Russian Federation, Winner of the Russian Government Prize in the field of science and technology Prof. 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 complex modeling of complex systems and processes at different stages of their life cycle.

Research Fellows

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

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

Leading Researcher Dr. Tech. Sci. Prof. – Vladimir V. Mihailov – 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. Prof. – 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. of Economics Prof. – Dmitry N. Verzilin – modeling of socio-economic systems and processes, verzilin@sv101000.spb.edu

Leading Researcher Dr. Tech. Sci. Prof. – 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, zvarambler@rambler.ru

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

Leading Researcher Dr. Tech. Sci. Assoc. Prof. – Vadim V. Burakov – methodology of software quality evaluation, refactoring of software, Burakov@eureca.ru

Leading Researcher Dr. Tech. Sci. Prof. – 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. Assoc. Prof. – Alexander N. Pavlov – models and methods of multi-criteria decision making under uncertainty, pavlov62@list.ru

Senior Researcher PhD – Alexander N. Kozhanov – fundamental and applied research in 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 PhD Assoc. Prof. – 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 PhD – 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

Researcher PhD – Oleg F. Korolev – methodology of modeling automation, korolf@rambler.ru

Senior Researcher PhD – 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 PhD – 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

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

Post-graduate Students

Kulakov, A.Yu. (SPIIRAS third year post-graduate) – Models and algorithms for reconfiguring complex objects under changing conditions – superviser Pavlov, A.N.

Pimanov, Ilya Yuryevich – graduate student of SPIIRAS, set of 2014 – superviser Zelentsov, V.A.

Malysheva, Irma Vladimirovna – graduate student of SPIIRAS set of 2014 – superviser Sokolov, B. V.

Nazarov, Dmitry Igorievich – graduate student of SPIIRAS, set of 2014 – superviser Sokolov, B. V.

Krylov, Aleksei Valer'evich – graduate student of SPIIRAS, set of 2015 – superviser Sokolov, B. V.

Ohtilev, Pavel Alekseevich – graduate student of SPIIRAS, set of 2015 – superviser Sokolov, B. V.

Grants and Projects

Mikhailov, V.V. – Grant No.15-07-01230 of the Russian Foundation for Basic Research: “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. – Grant No.15-08-08459 of Russian Foundation for Basic Research: “Research and development of models and methods of complex adaptive planning of the system management of complex technical objects”. (2015-2017)

Sokolov, B.V. – Grant No.15-07-08391 of the Russian Foundation for Basic Research: “Context-sensitive predictive modeling complex to support decision making in transportation systems”. (2015-2017)

Yusupov, R.M. — Grant of the Russian Foundation for Basic Research No.16-07-00779 "Development of methodology and model-algorithmic suppoting of pro-active management of socio-cyber-physical systems structural dynamics”.

Zelentsov, V.A. — Grant No.16-08-00510 of the Russian Foundation for Basic Research: “Development and research of the methodology and creation of automated information 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) — Grant No.16-08-01277 of the Russian Foundation for Basic Research: “Research and development of models and algorithms for reconfiguration of ground and space based multifunction robotic systems in dynamic conditions” (Principal Investigator — Prof. Vladimir G. Parfjenov, University ITMO).

Sokolov, B.V., Potryasaev, S.A. (executors) — Grant No.16-19-00199-п of the Russian Foundation for Basic Research: “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 — Dr. Shalyto, A.A., University ITMO).

Sokolov, B.V. – Fundamental research Program of the Division of Nanotechnologies and Information Technologies (DNIT) RAS: "Fundamentals of Information Technology and Systems" “Intelligent information technology, systems analysis and automation” (Project No.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 design project "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: Concern Almaz-Antey.

Mironov, V.I. — Component of design project "Ground-21" "Methods and algorithms of optimum processing of navigation measurements of a polygon measuring complex". General Customer - the Ministry of Defence of the Russian Federation.

International project “Innovative teaching and learning atrategies in open modelling and simulation environment for student-centered engineering education / InMotion» according to programm ERASMUS.

Sokolov, B.V. — Component of design project "Development of RKD of a standard segment of the uniform virtual electronic passport of the space carrier rocket "Sojuz-2". Customer: Central Design Bureau Joint-stock Company “Rocket and Space Center "Progress””.

Sokolov, B.V. — Component of R&D project "Development of the road map in the "Control System of Perspective Fighting Equipment", Code "Cloak SU". Customer: Russian Foundation for Advanced Research in the Defence Industry.

Sokolov, B.V. – Component of design work “Development of methods and algorithmic support of integrated simulation of transport-energy module for calculation and analysis of indicators of reliability and survivability”. Customer: Federal State Unitary Enterprise Design Bureau “Arsenal”.

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.)

Russian Presidential Academy of National Economy and Public Administration: Faculty of Economics (Moscow): Decision-Making Theory (Mikoni, S.V.)

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

Mozhaysky’s MSA: 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.)

Mozhaysky’s MSA: 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++. (Zyuban, 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

I All-Russian military and scientific conference "Robotization of the Ministry of Defence of the Russian Federation". (Moscow, Kubinka, February 10, 2016) (Mironov, V. I.)

The All-Russian scientific and practical conference "Ballistics Yesterday, Today, Tomorrow" (to the 70th anniversary of the Department of navigation and ballistic ensuring application of space means and the theory of flight of aircraft foundation). (St. Petersburg, A.F.Mozhaysky MSA, February 25, 2016). (Mironov, V.I.)

Scientific and methodical INFORINO-2016 conference "Informatization of Engineering Education" (Moscow MEI, April 12-13, 2016) (Mikoni, S. V.)

The All-Russian scientific and practical conference "Problems of Creation and Use of Small Spacecrafts and Robotic Means for the benefit of the Armed Forces of the Russian Federation". St. Petersburg, A.F.Mozhaysky MSA, April 12-13, 2016. (Mironov, V. I.)

XXII international scientific and methodical conference "Modern education: contents, technology, quality", St. Petersburg, SPSEEU, April 20-21, 2016. (Mikoni, S. V.)

International scientific Arctic conference: history and present. April 20-21, 2016, St. Petersburg, Russia. (Mikhaylov, V. V.)

5th Computer Science On-line Conference 2016 (CSOC 2016) (April 27, 2016, Prague, Czech Republic). (Sokolov, B.V., Zelentsov, V. A., Potryasayev, S.A., Pavlov, A. N., Mochalov, V. F., Pashchenko, A. E., Korolev, O. F.)

Living Planet Symposium 2016, Prague, Czech Republic, May 09-12, 2016. (Zelentsov, V. A.)

The 14th All-Russian annual conference "Modern Problems of Remote Sensing of Earth from Space", Moscow, May 15-18, 2016. (Zelentsov, V. A.)

XIII International conference "Stability and Fluctuations of Nonlinear Control Systems", June 1-3, 2016, Moscow. (Sokolov, B.V., Okhtilev, M. Yu., Potryasayev, S.A.)

International conference "Digital Transformations & Global Society 2016" (DTGS 2016) St. Petersburg, Russia, June 23-24, 2016 (Sokolov, B. V., Mikhaylov, V. V., Mikoni, S. V.)

The third All-Russian forum in the field of information and communication technologies "IT Dialogue 2016", St. Petersburg, June 23-24, 2016. (Zelentsov, V. A.)

29 International scientific "Mathematical Modelling in the Equipment and Technologies" conference (MMTT-29) (St. Petersburg, June, 2016). (Musayev, A. A.)

3rd International Multidisciplinary Scientific Conference on Social Sciences and Arts SGEM 2016 (Aug. 24-31, 2016, Albena Resort, Bulgaria). (Mikhaylov, V. V.)

The 8th IEEE International Conference Intelligent Systems, (IEEE IS'2016). September 4-6, 2016, Sofia, Bulgaria. (Pashchenko, A.E., Sokolov, B.V., Pavlov, A. N.)

Forum on search of partners in the Cross-Border Cooperation Programme Russia-Estonia 2014-2020, St. Petersburg, September 7-8, 2016 (Zyuban A. V.)

II Interregional scientific and practical conference "Perspective Directions of Development of Domestic Information Technologies", Sevastopol, September 13-17, 2016 (Sokolov, B.V., Mikoni, S. V.)

Scientific and practical conference on the Problem of management and development of the Samara Region, September 20-25, 2016 Samara. (Mikhaylov, V. V.)

XVIII International conference "Problems of Management and Modelling in Difficult Systems" (PUMS-2016), September 20-25, 2016, Samara. (Mikhaylov, V. V.)

St. Petersburg International Innovative Forum, St. Petersburg, September 21-23, 2016 (Zyuban A. V.)

The 15th International Conference on Modeling and Applied Simulation (MAS2016), September 26-28, 2016, Cyprus. (Potryasayev, S.A., Sokolov, B.V.,)

The 4th International Workshop on Simulation for Energy, Sustainable Development & Environment (SESDE2016), September 26-28 2016, Cyprus. (Zelentsov, V. A., Potryasayev, S.A.)

Conference International programs of scientific and technical and border cooperation – the international programs, St. Petersburg, October 4, 2016 (Zyuban, A. V.)

9th Conference "Information Technologies in Management (ITU-2016)", October 4-6, 2016, St. Petersburg (Sokolo, B. V., Okhtilev, M. Yu., Mikhaylov, V. V., Ryzhikov, Yu.I., Kovalyov, A. P, Mikoni, S. V., Zyuban, A.V., Potryasayev, S.A., Pashchenko, A. E., Malysheva, I. V., Nazarov, D. I., Pimanov, I. Yu.)

Conference "Management in Sea and Space Systems" (UMAS-2016), October 4-6, 2016, St. Petersburg. (Sokolov, B.V., Zelentsov, V. A., Potryasayev, S.A., Pavlov, A. N., Pashchenko, A. E.)

9th Russian multiconference on problems of management. October 4-6, 2016, St. Petersburg. (Sokolov, B.V.)

Regional Conference "Inno-Tech: Innovative технологическое cooperation in chemistry for development of the Northwest region of Russia". St. Petersburg, October 5-7, 2016. (Musayev, A. A.)

Conference International programs of scientific and technical and border cooperation – national programs. St. Petersburg, October 11, 2016. (Zyuban, A. V.)

10th Jubilee IEEE AICT 2016 International Conference (Application of Information and Communication Technologies – AICT 2016), October 12-14, 2016, Baku, Azerbaijan. (Mikhaylov, V. V.)

Seminar "Erasmus+: prospects and opportunities for the universities of Russia", St. Petersburg, October 19, 2016. (Zyuban, A. V.)

The XV All-Russian Forum "Strategic planning in regions and the cities of Russia: dialogue in search of coherence". St. Petersburg, October 24-25, 2016. (Zyuban, A. V.)

XV Jubilee International Conference "Regional Informatics (RI-2016)", October 26-28, 2016, St. Petersburg (Sokolov B. V., Okhtilev M. Yu., Potryasayev S.A., Ryzhikov, Yu.I., Mikoni S. V., Musayev A.A.)

XXXII Interdepartmental scientific and practical conference "Development of Scientific and Technical Aspects of Methodology of Tests and Operation for the purpose of Increase in Efficiency of Application of the Existing Means and Systems of Experimental Testing Facilities". Mirny, 1 City Elections Commission of RF MD, November 1, 2016. (Mironov, V.I.)

GEO-XIII Plenary, St. Petersburg, November 07-09, 2016 (Zelentsov, V.A.)

The 4th Workshop on preservation and study of reindeers in Russia. World Wide Fund for Nature, Institute of biology of the Karelian Scientific Center of RAS. November 14-17, 2016, Petrozavodsk. (Mikhaylov, V.V.)

Capacity Building seminar and training according to the ERASMUS program. St.Petersburg, December 12, 2016. (Zyuban, A.V.)

Opening of the InMotion project according to the ERASMUS program. Bremen, Germany, December 18-22, 2016. (Zyuban A.V.)

Research Management

Zelentsov, V. A. —Program Committee Member, 5th International Computer Science On-line Conference 2016.

Musayev, A. A. — Organization of the 29th International scientific MMTT-29 conference "Mathematical Modelling in the Equipment and Technologies", St. Petersburg, June, 2016.

International Cooperation

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 non-commercial 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 Change Research Institute CAS, Brno, Czech Republic.

Cooperation with Tomas Bata University, Zlin, Czech Republic.

Participation in the International project “Innovative teaching and learning strategies in open modelling and simulation environment for student-centered engineering education / InMotion” according to ERASMUS Program

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

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

Cooperation with the 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.

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

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

Zyuban, 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”; 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

1. The patent for the invention No. 2580099 of March 11, 2016 (Bulletin No. 10) according to the application No. 2014121619 of May 27, 2014. "Device for definition of values of characteristics of readiness of a product for application" (Sokolov, B. V., Grishin, V. D., Pavlov, D. A., Potryasayev, S.A.).

2. The certificate on the state registration of the computer program No. 2016660671 of September 20, 2016 according to the application No. 2016618032 of 7/22/2016 "Missile Defence Unison Program for integration of diverse information resources in systems of decision-making support in various subject domains" (Sokolov, B. V., Zelentsov, V. A., Potryasayev, S.A., Pimanov, I. Yu., Pashchenko, A. E.).

Recent Results

1. There has been developed methodological support and experimental samples of software control modules of the internal and external functional and structural reconfiguration of OE SSV within nominal and predetermined operating modes; analytical and simulation modeling of scenarios of functions redistribution between onboard and ground-based SSV control complexes; computation and experiments performing; multi-criteria analysis of integrated index of reliability of OE SSV [2-4, 6-8, 10, 54, 57, 60, 61].
2. There has been designed a multiple-model, multi-criteria description of processes of proactive lifecycle (LC) control of transporting systems (TS) as well as relevant combined methods and algorithms for multivariate prediction of the processes of their creation and application [3-7, 56, 57, 60].
3. Scientific and methodological support for problem-solving of complex, adaptive planning of CS CTO work has been developed. That includes

combined methods and algorithms of complex operations planning and structure control of CS CTO in dynamically changing environment [34, 37, 44, 46, 54-57, 60].

4. The basic structure of the hierarchy of models for problem solution in proactive structure dynamics control in socio-cyber-physical system (SCPS) has been invented. The latter included classic analytical and simulation models of SCPS elements' behavior, logic and dynamic control models of interaction operations, resources, flows, and structural dynamics in SCPS systems [14, 22].

5. The conceptual bases of automation and intellectualization of problems in predicting the dynamics of vegetation in Far North on the basis of integrated use of multi- and hyperspectral ground-based and aerospace data as well as climate information have been developed [13, 24, 34, 44, 46].

6. There has been developed a methodological basis of integrated processing of diversified multi- and hyperspectral data on the state of the vegetation cover of the Far North as well as the information on climate received from ground-based, aviation and space devices [48, 72].

7. The improvements were made for the procedures of the computation of the multi-channel systems with phase approximations of service by the matrix-geometric progression (MGP) method that is widely used by foreign and domestic researchers but mostly exclusively for the single-channel systems as well as by the iterative method of Takahashi-Takami. In order to eliminate deceleration of iterations convergence of computational experiments on calculating within a quadruple bit grid have been continued. A new elimination method has been introduced (submitted for a foreign publication) [53, 68, 69].

8. New theoretical solutions and software tools of control of translational and rotational motion of special spacecrafts at the stages of long- and short-ranged guidance for the efficient solution of the targets [49-52].

9. The necessity and the adequacy of the seven axioms to describe any methods for multi-criteria optimization on a finite set of alternatives have been proved. The systematization of the well-known methods has been proposed on their basis [32, 33, 66, 67, 88, 89].

10. The concept of complex information support and computerization of a technical university on the basis of cloud technologies with the formation of the multi-agent environment and virtual "mirror" of the higher education institution has been developed. This concept is focused on the use of cognitive educational technologies [38-42].

11. Methods and technology of integrated processing of ground-based, hyperspectral aviation and space data on the state of forest cover have

been developed, and testing by the example of the Baikal nature area has been held [24, 26, 27].

12. There has been developed a prototype of methodical software (MSS) and model-algorithmic support that includes the methodology of computer process organization based on business process notation BPMN (Business Process Model and Notation) and its performance with the help of BPEL language (Business Process Execution Language) in the software environment with service-oriented architecture as well as translation algorithm of the description of the computational process of notation BPMN into BPEL language and its interpretation in the sequence of requests to the services that provide access to the applied software modules and manipulation with input and output data; algorithm of formation and adjustment of BPEL interpreter requests to the finite service; translation algorithm of requests of the interpretator to the service into the set of input data for the application software module and after-action review of the computation to meet the request; algorithm for presenting the results of the computational process to the end user [14, 19, 21, 44, 47, 58, 62, 80].

13. Relating to the hydrodynamic model of the Severnaya Dvina River, the prototype of the system of operational forecasting of floods on the basis of service-oriented architecture has been improved and tested [1, 23, 25, 35, 43, 63]. New methods of control over the relevant computing processes on the basis of asynchronous calls and controlled request queues have been implemented [58, 62].

References

Papers Published in Editions Indexed by WoS, Scopus

1. A. M. Alabyan, I. N. Krylenko, S. A. Potryasaev, B. V. Sokolov, R. M. Yusupov, and V. A. Zelentsov. Development of Intelligent Information Systems for Operational River_Flood Forecasting // Herald of the Russian Academy of Sciences, 2016, Vol. 86, No. 1, pp. 24–33. © Pleiades Publishing, Ltd., 2016. DOI: 10.1134/S1019331616010056 ISSN 1019-3316
2. Dmitry Ivanov, Alexandre Dolgui, Boris Sokolov & Frank Werner. Schedule robustness analysis with the help of attainable sets in continuous flow problem under capacity disruptions, International Journal of Production Research // International Journal of Production Research. 2016. Vol. 54, No. 11. pp .3397–3413.
3. Dmitry Ivanov, Alexander Pavlov, Alexandre Dolgui, Dmitry Pavlov, Boris Sokolov. Disruption-driven supply chain (re)-planning and performance impact assessment with consideration of pro-active

and recovery policies // Transportation Research Part E 2016. (In Press)
4. Boris Sokolov, Dmitry Ivanov, Semyon A. Potryasaev. Flexible flow shop scheduling for continuous production // Int. J. Service and Computing Oriented Manufacturing. 2016. Vol. 2, No.2. pp.189-203.
5. Dmitry Ivanov, Alexandre Dolgui, Boris Sokolov. Robust dynamic schedule coordination control in the supply chain // Computers & Industrial Engineering. 2016. 94. pp. 18–31.
6. Dmitry Ivanov, Alexander Pavlov and Boris Sokolov. Exact and heuristic methods for integrated supply chain design reliability analysis // Int. J. Integrated Supply Management. 2016. Vol. 10, No. 2. pp. 206-224.
7. Alexander Pavlov, Dmitry Pavlov, Boris Sokolov. Minimization of disruption-related return flows in the supply chain // Int. J. Production Economics. (In Press)
8. Dmitry Ivanov, Alexandre Dolgui, Boris Sokolov, Frank Werner & Marina Ivanova. A dynamic model and an algorithm for short-term supply chain scheduling in the smart factory industry 4.0 // International Journal of Production Research. 2016. Vol. 54, No.2. pp.386-402.
9. Boris Sokolov, Dmitry Ivanov, Alexandre Dolgui & Alexander Pavlov. Structural quantification of the ripple effect in the supply chain // International Journal of Production Research. 2016. Vol.54, No.1. pp. 152-169.
10. Dmitry Ivanov, Boris Sokolov, Inna Solovyeva, Alexandre Dolgui & Ferry Jie (2016) Dynamic recovery policies for time-critical supply chains under conditions of ripple effect, International Journal of Production Research, 54:23, 7245-7258
11. Dmitry Ivanov, Boris Sokolov, and Inna Solovyeva. Chapter 12. Integrated Planning and Scheduling with Dynamic Analysis and Control of Service Level and Costs // Metaheuristics for Production Systems. Operations Research/Computer Science. Interfaces Series. Volume 60 Switzerland: Springer International Publishing, 2016
12. Dmitry Ivanov, Boris Sokolov, Marina Ivanova. Schedule coordination in cyber-physical supply networks Industry 4.0 // IFAC-PapersOnLine. 2016. Vol.49, No.12. pp.839–844.
13. Viacheslav A. Zelentsov, Sergey Nemykin and Boris Sokolov. Conceptual and Formal Modelling of Monitoring Systems Structure-Dynamics Control // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory

Perspectives in Intelligent Systems / Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.). - Switzerland: Springer, 2016. - pp. 391-403. ISSN 2194-5357 ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2

14. Oleg Korolev, Vladimir Parfenov and Semyon Potryasaev. Program System for Solving Problems of Monitoring Social and Economic Development of Saint-Petersburg // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory Perspectives in Intelligent Systems / Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.). - Switzerland: Springer, 2016. - pp. 371-381. ISSN 2194-5357 ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2
15. Vyacheslav Arhipov, Vadim Skobtsov, Natalia Novoselova, Victor Aliushkevich and Alexander Pavlov. Development of Event-Driven Models for Operation Data of Some Systems of Small Satellites // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory Perspectives in Intelligent Systems / Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.). - Switzerland: Springer, 2016. - pp. 403-413. ISSN 2194-5357. ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2
16. Anton E. Paschenko, Alexander N. Pavlov, Alexey A. Pavlov, Alexey A. Slin'ko and Alexander A. Masalkin. Research into Structural Reliability and Survivability of Complex Objects // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory Perspectives in Intelligent Systems /. Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.). - Switzerland: Springer, 2016. - pp. 463-473. ISSN 2194-5357 ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2
17. Boris Sokolov, Karim Benyamna and Oleg Korolev. RFID Technology for Adaptation of Complex Systems Scheduling and Execution Control Models // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory Perspectives in Intelligent Systems / Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.). - Switzerland: Springer, 2016. - pp. 433-442. ISSN 2194-5357 ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2

18. Yuriy Skobtsov, Alexander Sekirin, Svetlana Zemlyanskaya, Olga Chengar, Vadim Skobtsov and Semyon Potryasaev. Application of Object-Oriented Simulation in Evolutionary Algorithms // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory Perspectives in Intelligent Systems /Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.). - Switzerland: Springer, 2016. - pp. 453-473. ISSN 2194-5357 ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2
19. Boris Sokolov, Vladimir Kalinin, Sergey Nemykin, Dmitry Ivanov. Models and Algorithms for Abilities Evaluation of Active Moving Objects Control System // Proceedings of the 30th European Conference on Modelling and Simulation ECMS 2016. May 31 – June 3, 2016. Regensburg, Germany. pp. 467–473.
20. Alexander Pavlov, Boris Sokolov, Anton Pashchenko, Anatoly Shalyto, Gennady Maklakov. Models and methods for multicriteria situational flexible reassignment of control functions in man-machine systems // Proccedeings of the 8th IEEE International Conference Intelligent Systems (IEEE IS'2016). September 4-6, 2016, Sofia, Bulgaria.
21. Boris Sokolov, Semyon Potryasaev, Nikolay Mustafin, Sergey Nemykin, Vladimir Kalinin. Optimal structure coordination in supply chain (SC): principles, models, methods and algorithms for the SC structure dynamics control // The 15th International Conference on Modeling and Applied Simulation (MAS2016). September 26-28, 2016. Cyprus: Proceedings. pp. 31-38.
22. Boris Sokolov, Semyon Potryasaev, Karim Benyamna, Irina Sokolova, Dmitri Ivanov. Methodological and technical basis for interdisciplinary investigation in the field of cyber-physical-socio systems // The 15th International Conference on Modeling and Applied Simulation (MAS2016). September 26-28, 2016 Cyprus: Proceedings. pp.104-111.
23. Zelentsov Viacheslav, Potryasaev Semen, Sokolov Boris. Multidisciplinary approach to flood forecasting on the base of earth observation data and hydrological modelling // Proc. ‘Living Planet Symposium 2016’, Prague, Czech Republic, May 9–13, 2016 (ESA SP-740, August 2016), 1141.
24. Viacheslav Zelentsov, Boris Sokolov, Olga Grigorieva, Viktor Mochalov, Semen Potryasaev, Viktor Shumeiko. “Resurs-P” satellite hyperspectral data: preliminary evaluation of information capacities

// Proc. ‘Living Planet Symposium 2016’, Prague, Czech Republic, May 9–13, 2016 (ESA SP-740, August 2016), 1789.
25. Viacheslav A. Zelentsov, Semyon A. Potryasaev, Ilja J. Pimanov, Sergey A. Nemykin. Creation of Intelligent Information Flood Forecasting Systems based on Service Oriented Architecture // Automation Control Theory Perspectives in Intelligent Systems: Springer, 2016, Vol. 3. pp. 371-382.
26. Victor F. Mochalov, Andrei V. Markov, Olga V. Grigorieva, Denis V. Zhukov, Olga V. Brovkina and Ilya Y. Pimanov. Remote Sensing for Environmental Monitoring. Complex Modeling // Proceedings of the 5th Computer Science On-line Conference 2016 (CSOC2016). Vol 3: Automation Control Theory Perspectives in Intelligent Systems /Radek Silhavy, Roman Senkerik, Zuzana Kominkova Oplatkova, Zdenka Prokopova, Petr Silhavy (Eds.) // Switzerland: Springer, 2016. - pp. 497-506. ISSN 2194-5357 ISSN 2194-5365 (electronic) DOI 10.1007/978-3-319-33389-2
27. O. Grigorieva, O. Brovkina, V. Mochalov, Y. Akhtman, V. Zelentsov, S. Potryasaev, I. Kozyr, N., Belova. A Complex Model for Forest Ecosystem State Assessment Based On Remote Sensing Data: Case Study in Baikalsky Nature Reserve // The 4th International Workshop on Simulation for Energy, Sustainable Development & Environment (SESDE2016). September 26-28, 2016 Cyprus: Proceeding. pp. 14-19.
28. Ponomarenko, M.R., Pimanov, I.Yu. Processing of SaR amplitude images with posting the results on web server, J. Sib. Fed. Univ. Eng. technol., 2016, 9(7), 994-1000. DOI: 10.17516/1999-494X-2016-9-7-994-1000.
29. Mikoni, S.V. Application of the Universal Decision Support System SVIR to Solving Urban Problems // Springer International Publishing AG 2016. A.V. Chugunov et al. (Eds.): DTGS 2016, CCIS 674, pp.1-14.
30. Klokov, K.B., Mikhailov, V.V. Dependence of traditional reindeer herding of Siberian indigenous peoples on climate conditions. Regional aspect // SGEM2016 Conference Proceedings, ISBN 9786197105773/ ISSN 23675659, August 24-31, 2016, Book 3. Vol. 2, pp. 45-52. DOI: 10.5593/SGEMSOCIAL2016/B32/S08.007
31. Mikhailov, V., Klokov, K., Pestereva, A. Analysis of bioclimatic structure of animals’ habitats on the base of the heat balance simulation // Proceedings of 10th Anniversary IEEE AICT 2016 International Conference. pp. 390-394.

Papers Published in Russian Editions Indexed by RSCI

32. Mikoni, S.V. Axiomatics of methods of multicriteria optimization on a final set of alternatives // Spiiras Proceedings. 2016. Vol. 44. pp. 198-214.
33. Mikoni, S.V. About a class, classification and systematization // Design ontology. 2016. Vol.6, No. 1(19). pp. 67-80.
34. Burakov, V.V., Zelentsov, V. A., Potryasaev, S.A., Sokolov, B. V., Kalinin, V. N. Methodological and methodical bases of estimation and choice of effective technologies of automated management of active mobile objects on the basis of complex modeling//H&ES Research. 2016. Volume VIII. No.3. pp. 6-13.
35. A. M. Alabyan, V. A. Zelentsov, I. N. Krylenko, S. A. Potryasaev, B. V. Sokolov, R. M. Yusupov. Creation of intellectual information systems of expeditious forecasting of river floods//Bulletin of the Russian Academy of Sciences. 2016. Volume 86, No. 2. pp. 127-137. DOI: 10.7868/S086958731602002X
36. E.P.Minakov, B. V. Sokolov. Analysis of characteristics of placement and options of application of monoblock stationary land weapons of destruction of asteroids // SPIIRAS Proceedings, Vol. 5(48), 2016.). pp. 181-194. ISSN 2078-9181 DOI 10/15622/sp.48
37. B. V. Sokolov, V. A. Palitsyn. Control algorithms of complexes of measuring means//Herald of Aerospace Defense. 2016. No. 4(12). pp. 9-16.
38. Musayev, A. A., Serdyukov, Yu. P. The generalized uncertainty ratio for signals//News SPGTI. 2015. No. 27(53). pp. 66-70.
39. Musayev, A. A., Serdyukov, Yu. P. Correlation of uncertainty of signals as a criterion for evaluation of physical speed of information transfer // SPIIRAS Proceedings, Vol. 2 (45), 2016. pp. 58-73.
40. Musayev, A. A., Shevchik, A. P. Cognitive call: expectations and fulfillments//News SPGTI. 2016. No. 33 (59). pp. 84-90.
41. Musayev, A. A., Shevchik, A. P. Society of knowledge: paradigm of cognitive education//Alma mater. Bulletin of the higher school. 2016. No.6. pp. 6-13.
42. Musayev, A. A., Shevchik, A. P. Cognitive university: the concept of creation of the information educational environment of higher education institution//Informatization in science and education. 2016. No. 3(31). pp. 3-16.
43. Zelentsov, V. A., Potryasayev, S.A., Pimanov, I. Yu., Semenov, A. E. Monitoring and modeling of floods on the basis of system about service - the focused architecture//Georisk. 2016. No. 1. Moscow: Prod.: Geomarketing, 2016. pp. 12-15.

44. Burakov, V.V., Zelentsov, V. A., Potryasaev, S.A., Sokolov, B.V., Kalinin, V.N. Methodological and methodical bases of estimation and choice of effective technologies of automated management of active mobile objects on the basis of complex modeling // High technologies in space researches of Earth. 2016. Vol.8, No.3. pp. 6-12.
45. Stepanov, P. A., Okhtilev, M. Yu. Application of computing models for creation of the editor of charts // News of Higher education institutions. Instrument Making. 2016. Vol. 59, No. 11. pp. 939 — 943. DOI: 10.17586/0021-3454-2016-59-11-939-943 ISSN (0021-3454 printing version; 2500-0381 online version)
46. Zelentsov, V. A., Kovalyov, A. P., Pimanov, I. Yu. A hierarchical control system of development of territories with use of diverse spatial data // News of Higher education institutions. Instrument making. 2016. Vol. 59, No. 11. pp. 944 — 951. DOI: 10.17586/0021-3454-2016-59-11-944-951 ISSN (0021-3454 printing version; 2500-0381 online version)
47. Potryasaev, S.A. Complex modeling of difficult processes on the basis of the notation of BPMN // News of Higher education institutions. Instrument making. 2016. Vol. 59, No. 11. pp. 913 — 920. DOI: 10.17586/0021-3454-2016-59-11-913-920 ISSN (0021-3454 printing version; 2500-0381 online version)
48. Kolpashchikov, L. A., Mikhaylov, V. V. Current state and tendencies of change of population structure of wild reindeers of Taymyr // Principles of ecology, 2016. Vol.5. No. 3. pp. 60-58.
49. Mironov, V. I., Zotkin, M. Yu. Algorithms of calculation of pulse programs of management of an angular turn of KA // Information and Space. 2016. Issue 2(6). pp. 113-117.
50. Mironov, V. I., Zotkin, M. Yu. Definition of the program of management of an angular turn of the spacecraft in Rodrigue-Hamilton's parameters//Works VKA of A.F.Mozhaysky, No. 654, 2016. 7 p.
51. Nikolaev, S.P., Mironov, V. I., Korolyov, S. Yu., Zotkin M. State of development and prospects of development of KA - observations // Proceedings of A.F.Mozhaysky MSA. Operational Level of War and Tactics of MSF Troops. No. 652, 2016. – pp. 199-205.
52. Mironov, V. I., Zotkin, M. Yu., Burmistrov, V. V., Makarov, M. M. Ways to increase the speed of algorithms calculating the programs of terminal traffic control of KA on the trajectory's active part // The scientific and technical herald of information technologies in mechanics and optics", SPSUITMO, 2016. – 8 p. (In Press)

53. Ryzhykov, Yu. I., Ulanov, A. V. Application of H2 approximation to problems of calculation of non-Markov systems of mass service // Herald of the Tomsk State University. Management, computer facilities, informatics. 2016. No. 3(36). pp. 60-65. DOI: 10.17223/19988605/36/6 ISSN: 1998-8605 eISSN: 2311-2085
54. S.A. Nemykin, M.Yu.Okhtilev, P.A.Okhtilev, A.V. Krylov, B.V. Sokolov. Analysis and justification of approaches to creation of systems of decision-making support in ACS objects of military public administration // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 185-193.
55. V.G. Parfyonov, F.M.Kulakov, M.Yu.Okhtilev, B. V. Sokolov. Proactive technologies of management of multipurpose robotic complexes // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 209-217.
56. B.V. Sokolov, M.Yu.Okhtlev. Methodological and technological bases for realization of new generation of control systems of life cycle of space means // Systems of design, technological preparation of production and management of stages of life cycle of an industrial product (CAD/CAM/PDM-2016). Theses of the 16th international youth conference. A. V. Tolok (Ed.) M.: LLC Analitik. pp. 124.
57. B.V. Sokolov, M.Yu.Okhtlev. Methodological and technological bases for realization of new generation of control systems of life cycle of space means // Systems of design, technological preparation of production and management of stages of life cycle of an industrial product (CAD/CAM/PDM-2016). Works of the XVI international youth conference. A. V. Tolok (Ed.). M.: LLC Analitik. pp. 383-387.
58. S.A. Potryasayev. Complex modeling of ACS production with use of the notation of BPMN // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 218-223.
59. V.V. Zakharov, S.A. Potryasayev, V.I. Salukhov, V.P. Shkodyrev. Information technology of definition of location of a mobile robotic complex by methods of radio-frequency identification // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 104-111.
60. A.V. Tuzikov, O.I. Semenkov, A.I. Ptushkin, B.V. Sokolov, R.M. Yusupov. The perspective directions in improvement of con-

trol systems of life cycle of space means based on creation of uniform scientific information space of the Union State // Printed materials, Plenary Session of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 29-48.
61. V.A. Zelentsov, A.N. Mironov, A.N. Pavlov, A.E. Pashchenko, S.A. Potryasayev, B.V. Sokolov, L.A. Sorokin. A program complex for calculation and the multicriteria analysis of indicators of reliability and survivability of the spacecrafts onboard equipment: state of development and direction of use // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 408-415.
62. A.E. Pashchenko, S.A. Potryasayev, A.P. Kovalyov Ispolzovaniye of the service tire of the enterprise at modular architecture of applications // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 431-434.
63. I.Yu.Pimanov. Representation of results of forecasting of floods means of information and analytical system about service - the focused architecture // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 431-434.
64. I.Yu. Pimanov, M.R. Ponomarenko. Use of geoinformation technologies and data of radar shooting for monitoring of objects of mining // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 435-439.
65. Mikhaylov, V. V., Solovyova, T. N., Kuzmin, D. V. To a problem of development of the system of control of the walking robot // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016.
66. Mikoni, S.V. Systematization of properties of difficult technical systems // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 84-95.
67. Mikoni, S.V. Problems of quality of rating estimation under the conditions of market economy // Regional informatics and information security: Collection of works. Issue 2. SPb.: SPOISU, 2016. pp. 184-189.
68. Yu.I.Ryzhikov. An iterative method of calculation of multichannel systems of service - a basis, modifications and limit opportunities //

Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 224-233.
69. Yu.I. Ryzhikov. Modification and prospects of a matrix geometric progressions method. // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 234-243.
70. V. A. Palitsyn, I. V. Malysheva, D.I.Nazarov, A. V. Zyuban, B. V. Sokolov. Methods and algorithms of construction and use of areas of approachibility in space the sistemotekhnicheskikh of parameters // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 201-208.
71. Mikhaylov, V. V., Solovyova, T. N., Kuzmin, D.V. Modelling of movement of the walking robot on an uneven surface. Problems of management and modeling in difficult systems // Works of the XVIII International conference "Problems of Management and Modelling in Difficult Systems" (PUMS-2016), September 20-25, 2016, Samara. Samara: Prod. Etching, 2016. pp. 421-429.
72. Mikhaylov, V.V., Kolpashchikov, L.A. Problems of protection and rational use of wild reindeers of Taimyr population in modern social and economic conditions//Scientific works of federal state budgetary institution "Joint Directorate of Reserves of Taymyr". Issue 1. Norilsk: Prod. "APEX", 2016. pp. 17-30.
73. Musayev, A. A., Zagaynov, A. I., Zakharov, A. I. Modeling and analysis of change of fractality of cardiological processes// Collection of works of the 29th international scientific MMTT-29 conference. – Saratov: 2016. Volume 2. pp. 161-167.
74. Musayev, A. A., Serdyukov, Yu. P. Models of signals with optimum characteristics in temporary and frequency areas // Collection of works of the 29th of the international scientific MMTT-29 conference. – Saratov: 2016. Vol. 2. pp. 116-122.
75. Musayev, A. A., Mitroshin, D. G. Nonparametric structurization in problems of modeling of chaotic processes // Collection of works of the 29th international scientific MMTT-29 conference. – Saratov: 2016. Vol. 5. pp. 83-92.
76. A. A. Musayev, A.A. Nozik, L.A. Rusinov. Predictive analysis of safety of industrial enterprise// News SPGTI. 2016. No. 34(60). pp. 87-93.
77. Musayev, A. A., Shevchik, A. P. Current trends of technological education// Materials of a regional conference "Inno-Tech: Innovative

технологическое cooperation in chemistry for development of the Northwest Region of Russia". - SPb.: October 05-07, 2016. – 127 p.
78. Musayev, A. A., Shevchik, A. P. Kognitivistika: New challenge of information era // Regional informatics and information security: Collection of works. – SPb, 2016. pp. 21.

Other Publications

79. B. V. Sokolov, M.Yu.Okhtilev. Methodological and methodical bases of creation and use of intellectual systems of pro-active management of transport and logistic complexes/ /Logistics: current trends of development. Ch.2: Materials of XV International Scientific and Practical Conference. – April 7- 8, 2016: Collected papers / V.S. Lukinsky et al (Eds.).. - SPb.: GUMRF named after Admiral S. O. Makarov, 2016. pp. 104-107.
80. M.Yu.Okhtilev, B. V. Sokolov, S. A. Potryasayev. Model and algorithms of estimation of robustness of the an information system functioning plan // Materials of the XIII International conference "Stability and Fluctuations of Nonlinear Control Systems", June 1-3, 2016, Moscow. / V. N. Tkhay (Ed.). - M.: ICP RAN, 2016. – pp. 270-271.
81. I.V. Solovyova, B.V. Sokolov, D.A. Ivanov. About controllability of one chain of deliveries // Materials of the XIII International conference "Stability and Fluctuations of Nonlinear Control Systems", June 1-3, 2016, Moscow / V. N. Tkhay (Ed.).. - M.: ICP RAN, 2016. – pp. 344-346.
82. Okhtilev, M. Yu., Sokolov, B. V., Potryasayev, S.A., Ivanov, D. A. Comprehensive planning of application of control systems of compex dynamic objects // Tanayev Readings: papers of the Seventh International Scientific Conference, March 28-29, 2016, Minsk. - Minsk: OIPI NAS of Belarus, 2016. – pp. 144-148.
83. R.M.Yusupov, B. V. Sokolov. Methodological and methodical bases of estimation and analysis of influence of information technologies on efficiency of control systems // Perspective directions of development of domestic information technologies: Printed Materials of the II Interregional theoretical and Practical Conference, Sevastopol, September 13-17, 2016. pp. 10-14.
84. S.N.Baranov, B. V. Sokolov, A. M. Telezhkin, N. G. Mustafin. Models of risks in program projects // Perspective directions of development of domestic information technologies: Printed Materials of the II Interregional theoretical and Practical Conference, Sevastopol, September 13-17, 2016. pp. 45-46.

85. Dyufur, M. S., Ignatyev, M. B., Katermina, T. S., Konovalov, M. A., Nenashev, V. A., Sokolov, B. V., Shepeta, A. P., Yusupov, R. M. Modeling of the movement of earth's plates for forecasting the lithospheric weather // the XI All-Russian conference "Methodological Problems of Management of Macrosystems", Apatity, March 3 - 26 April, 2016. Printed Materials. - Apatity: KNTs RAS, 2016. pp. 18-20.
86. Ignatyev, M. B., Sokolov, B. V., Yusupov, R. M. Modeling of a global sociocultural cycle as bases of innovative development// XI All-Russian conference "Methodological Problems of Management of Macrosystems" Apatity, March 3 - 26 April, 2016. Printed Materials. - Apatity: KNTs RAS, 2016. pp. 22-24.
87. B. V. Sokolov, R.M.Yusupov. SPIIRAS basic and applied research for the benefit of National Security // Social and psychological aspects of ensuring National Security: Printed materials Mezhdunar. International Scientific and Practical Conference, Minsk, December 3-4, 2015: in 2 vol./ National Security Institute of Republic of Belarus; S. N. Knyazev et al (Eds.) - Minsk, 2016. - Vol.1. pp. 312-316.
88. Mikoni, S. V. A solution of the problem of import substitution on the example of system of the choice and ranging of SVIR//Materials II of the interregional scientific and practical conference "Perspective Directions of Development of Domestic Information Technologies" Sevastopol, September 13-17, 2016. Sevastopol: SevSU, 2016. pp. 26-27.
89. Mikoni, S. V. The laboratory practical work realizing system approach to studying the methods based on multi-criteria // Proceedings of the scientific and methodical INFORINO-2016 conference "Informatization of Engineering Education", Moscow, MEI, April 12-13, 2016. M.: MEI, 2016. pp. 167-171.
90. Gerasimov, I. V., Kuzmin, S.A., Mikoni, S. V. Cognitive models of a design discourse: the practice-focused educational and research tasks of master educational programs for the "Informatics and Computer Facilities" direction // Proceedings of the XXII international scientific and methodical conference "Modern education: contents, technology, quality", St. Petersburg, SPSEEU, April 20-21, 2016. Vol. 1. SPb.: SPSEEU, 2016. pp. 21-23.
91. Mironov, V. I., Zotkin, M. Yu. Ways of increasing the speed of algorithms for calculation of programs of management of KA observation of the angular movement //"Problematic issues of arms' operation at KKP". Inv. 346298, SPb: A.F.Mozhaysky MSA, 2016. – pp. 198-205. ISSN 2218-5429

92. Mironov, V. I., Zotkin, M. Yu. Ways of increasing the speed of control algorithms of an angular turn at KA observation // "Problematic issues of operation of of arms' operation at KKP ", 10/13/2016, Inv.346298, A.F.Mozhaysky MSA, 2016. - pp. 198-205.
93. Mironov, V. I., Zotkin, M. Yu. Application of a method of the close correcting operator for calculation of the pulse program of an angular turn of the spacecraft management // Proceedings of the I All-Russian military and scientific conference "Robotization of the Ministry of Defence of the Russian Federation".- Moscow: Cubinka, October 2, 2016, UDC 681.51, pp. 406-411.
94. Mironov, V. I., Zotkin, M. Yu. Application of the method of a close correcting operator for calculation of the program of an angular turn of the spacecraft management with a finite vector of operating moments // Collected Articles of the I All-Russian scientific and practical conference "Ballistics Yesterday, Today, Tomorrow", in commemoration of the 70th anniversary of the department of navigation and ballistic ensuring application of space means and the theory of aircraft's flight - SPb: A.F.Mozhaysky MSA, February 25, 2016.
95. Mironov, V. I., Zotkin, M. Yu. Metod of the close correcting operator in tasks of management of the angular movement of spacecrafts // Collected Articles of the All-Russian scientific and practical conference "Problems of Creation and Use of Small Spacecrafts and Robotic Means for the benefit of the Armed Forces of the Russian Federation".- SPb: A.F.Mozhaysky MSA, April 12-13, 2016. pp. 462-468.
96. Mironov, V. I., Zotkin, M. Yu. Application of a multistep method of angular stabilization of the spacecraft with one active site of management // Proceedings of the XXXII Interdepartmental scientific and practical conference "Development of Scientific and Technical Aspects of Methodology of Tests and Operation Intended for Increasing an Efficiency of Application of the Existing Means and Systems of Experimental Testing Facilities".- Mirny: 1 City Elections Commission of the RF MD, January 11, 2016.
97. Musayev, A. A., Shevchik, A. P. Quiet cognitive revolution // Expert. 2016. No. 4(972). pp. 44-51.
98. Musayev, A. A., Shevchik, A. P. Technologies of intelligence development: system of cognitive education // Monograph "Problems and Tendencies of Development of the Higher Education in Russia and Abroad". Section 3.3. - Ulyanovsk: Zebra Publishers, 2016. – pp. 223 – 234.

Laboratory of Theoretical and Interdisciplinary Problems of Informatics

Head of Laboratory: Dr. in Phys. and Math Sci PhD Assoc. Prof. Alexander Lvovich Tulupyev – representation and processing of data and knowledge with uncertainty, 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 – 11 members and 1 Ph.D. 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), biosocial 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. PhD Assoc. Prof. Tatiana Valerievna Krasnoselskikh – the rationale and development of modern multidisciplinary STI prevention strategies for the high risk populations, tatiana.krasnoselskikh@gmail.com

Senior Researcher PhD in Psychology Assoc. Prof. Tatiana Valentinovna 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 PhD in Phys. and Math. Sci. Alexander Vladimirovich Sirotkin – algebraic Bayesian networks: computational aspects of probabilistic logic inference under uncertainty, application of the Bayesian methods to ranging problems, avs@iias.spb.su

Senior Researcher PhD Tech. Sci. Denis Vyacheslavovich Stepanov – genetic algorithms, probabilistic methods in machine learning, nonlinear filtration, denis_v_stepanov@hotmail.com

Senior Researcher PhD in Phys. and Math. Sci. Alena Vladimirovna 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 PhD 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 Postgraduate Student Valeriya Fuatovna Stolyarova – "Probabilistic graphical models in methods and algorithms for analysis of risks associated with respondents' behavior" (Sc. Adv. Tulupyev A.L.), valerie.stoliarova@gmail.com

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

Junior Researcher Maksim Victorovich 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 Aleksey Ivanovich Berezin – analysis, optimization, synthesis and visualization of global structures' hierarchy in probabilistic graphical models, beraliv.spb@gmail.com

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

Grants and Projects

Tulupyev, A.L. – Grant of the Russian Foundation for Basic Research No. 15-01-09001-a "Combined Probabilistic-Logic Graphical Approach to Representation and Processing of Uncertain Knowledge Systems: Algebraical Bayesian Networks and Related Models", (2015–2017).

Stepanov, D.V. – Grant of the Russian Foundation for Basic Research No. 14-01-00580-a "Hybrid methods, models and algorithms for analysis and synthesis of parameters estimation of latent processes in complex social systems under information deficiency", (2014–2016).

Suvorova A.V. —Grant of the Russian Foundation for Basic Research 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. — Grant of the Russian Foundation for Basic Research 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: "Software systems development", "Finite graph theory and its applications", "Bayesian network theory" (Tulupyev, A.L.).

SPSU, Faculty of Mathematics and Mechanics, Computer Science Department: “Essentials of the data analysis and data processing”, “Human Computer Interaction”, “Technologies of Professional Communication” (Tulupyeva, T.V.).

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

HSE, Data Science minor: “Programming with Data and Reproducible Research”, “Data Analysis and Data Technologies”, “Data Mining and Elements of Machine Learning” (Suvorova, A.V., Sirotkin, A.V.)

Conferences

First International Early Research Career Enhancement School on Biologically Inspired Cognitive Architectures (FIERCES on BICA 2016). Moscow, April 21–24, 2016 – Abramov, M.V., Tulupyev, A.L., Tulupyeva, T.V.;

First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16). Sochi, May 16–21, 2016 – Abramov, M.V., Berezin, A.I., Malchevskaya, E.A., Suvorova, A.V., Toropova, A.V., Tulupyev, A.L., Tulupyeva, T.V.;

International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg, May 25–27, 2016 – Abramov, M.V., Berezin, A.I., Malchevskaya, E.A., Suvorova, A.V., Toropova, A.V., Tulupyev, A.L., Tulupyeva, T.V.;

National Congress of Historians of State and Law and History of Political and Legal Doctrines “Borderland in the history of law and political and legal thought”, Mragowo, Poland, September 11–19, 2016 – Abramov, M.V.;

3rd GESIS Computational Social Science Winter Symposium 2016. Cologne, Germany, November 30 – December 1, 2016 – Suvorova, A.V.;

All-Russian scientific Conference on informatics problems SPISOK-2016. Saint-Petersburg, April 26-29, 2016 – Abramov, M.V., Berezin, A.I., Malchevskaya, E.A., Suvorova, A.V., Toropova, A.V., Tulupyev, A.L., Tulupyeva, T.V., Kharitonov, N.A.;

3-rd All-Russian Pospelovskaya Conference with international participation “Hybrid and synergistic intelligent systems” GISIS’2016. Svetlogorsk, June 6-11, 2016 – Berezin, A.I., Malchevskaya, E.A., Toropova, A.V., Tulupyev, A.L.;

9-th Conference “Information technology in control (ITC-2016)”. St. Petersburg, October 4-6, 2016 – Malchevskaya, E.A., Suvorova, A.V., Toropova, A.V., Tulupyev, A.L.;

15-th National Conference on Artificial Intelligence with international participation KII-2016. Smolensk, October 3-6, 2016 – Abramov, M.V., Suvorova, A.V., Tulupyev, A.L.;

The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016 – Abramov, M.V., Berezin A.I., Malchevskaya E.A., Suvorova A.V., Toropova A.V., Tulupyev A.L., Tulupyeva T.V.;

Scientific-practical Conference with international participation “HIV and immunosuppression. Heavy and comorbid forms of HIV. Epidemiology and modern strategy”. St. Petersburg, October 17-18, 2016 – Suvorova, A.V., Tulupyev, A.L.

Research Management

Section “Information technologies in social computing” at “Regional Informatics (RI-2016)”: section chairman - Tulupyev, A.L.

Section “Probabilistic graphical models, fuzzy systems, Soft Computing and Social Computing” at SPISOK-2016: section chairman - 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.

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

Recent Results

1. We developed an approach to the informational system's working processes sustainability estimation in case of social engineering attack actions on the users or group of users of the informational systems [1, 3, 10, 15, 21, 23].
2. We developed an approach to the construction of employees’ social graph based on social and structural data from social network sites. Methods for constructing user's vulnerabilities profile based on such information from accounts on social network site were analysed [17, 34, 39, 40, 48].
3. We proposed PGM that incorporates copulae as other class of probabilistic graphical models for the problem of estimation of person's risky

behavior rate on the data about several last episodes. This class included vines with copula--vine specification and non-parametric continuous Bayesian belief network [44].

4. Risky behavior model based on Bayesian belief network was tested with the data about publishing posts on social network site; the model showed good quality results comparing to the real behavior rate. We synthesized the structure of risky behavior model based on automatically generated data and showed that the data-based structure represented better quality scores, while the expert-based structure showed better prediction quality. We proposed the method for coherence diagnostics of respondents' answers on the base of latent variables [7, 8, 13, 14, 20, 28, 29, 33, 37, 46].

5. We build pairwise estimations of complexity for rival algorithms for generation minimal joint graph (greedy and incremental, straight and incremental, straight and improved incremental algorithms). The dependency between two parameters of minimal joint graph measurements was visualised via 3D-plot. Normality of distribution of relative statistics estimates was analysed [18, 24, 25, 31].

6. We implemented local library for probabilistic logical inference in algebraic Bayesian networks and formalized algorithm for the implementation of local posteriori inference for alternative models of knowledge patterns, the corresponding theorems were proved [9, 12, 32, 36, 42].

7. The decremental and incremental minimal join graphs' synthesis algorithms were described and implemented. It has been shown that the algorithms are more effective than existing one based on statistical complexity estimates. The algorithms have been analyzed using a big number of vertices, there have been suggested using a pagination for further this structure synthesis optimization [4, 5, 24, 25, 30, 41].

Awards

Malchevskaya, E.A., Tulupyev, A.L., Berezin, A.I. – "Best Paper Award" for the presentation at the IITI'2016 conference.

References

Monographs

1. Azarov, A.A., Tulupyeva, T.V., Suvorova, A.V., Tulupyev, A.L., Abramov, M.V., Yusupov, R.M. Social engineering attacks; The problems of analysis. St. Petersburg: Nauka, 2016. 349 p.

Papers Published in Editions Indexed by WoS, Scopus

2. Ustinov, A., Suvorova, A., Belyakov, A., Makhamatova, A., Levina, O., Krupitsky ,E., Lioznov, D., Niccolai, L., Heimer, R. Psychiatric

Distress, Drug Use, and HIV Viral Load Suppression in Russia // AIDS and Behavior. 2016. 20 (8). pp. 1603–1608 (Web of Science).
3. Abramov, M.V., Azarov, A.A. Social engineering attack modeling with the use of Bayesian networks // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 58–60.
4. Berezin, A. I., Ivanova, A. V., Zotov, M. A. Minimal join graphs' set synthesis: Performance statistical estimate of the decremental algorithm // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 42–44.
5. Berezin, A. I., Romanov, A. V., Zotov, M. A. Algebraic Bayesian networks secondary structure synthesis: All possible minimal join graphs' set capacity estimate // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 76–78.
6. Romanov, A.V., Levenets, D.G., Zolotin, A.A., Tulupyev, A.L. Incremental synthesis of the tertiary structure of algebraic Bayesian networks // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 28–30.
7. Suvorova, A. V., Tulupyev, A. L. Evaluation of the model for individual behavior rate estimate: Social network data // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 18–20.
8. Toropova, A. V., Suvorova, A. V. Data coherence diagnosis in socially significant behavior model // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 14–17.
9. Zolotin, A.A., Malchevskaia, E.A. Matrix-vector algorithms of local posteriori inference in algebraic Bayesian networks on ideal of disjuncts // 2016 XIX IEEE International Conference on Soft Computing and Measurements (SCM). IEEE, 2016. pp. 31–34.
10. Azarov, A.A., Abramov, M.V., Tulupyev, A.L., Tulupyeva, T.V. Models and algorithms for the information system’s users’ protection level probabilistic estimation // Advances in Intelligent Systems and Computing. Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16). Vol. 2. 2016. pp.39–46
11. Levenets, D.G., Zotov, M.A., Romanov, A.V., Tulupyev, A.L., Zolotin, A.A., Filchenkov, A.A. Decremental and incremental reshaping of algebraic Bayesian Networks global structures // Advances in Intelligent Systems and Computing. Proceedings of the First International Scientific Conference “Intelligent Information

Technologies for Industry”(IITI’16). Springer International Publishing, 2016. pp. 57–67.
12. Mal’chevskaya, E.A., Berezin, A.I., Zolotin, A.A., Tulupyev, A.L. Algebraic Bayesian Networks: Local Probabilistic-Logic Inference Machine Architecture and Set of Minimal Joint Graphs // Advances in Intelligent Systems and Computing. Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry”(IITI’16). Springer International Publishing, 2016. pp. 69–79.
13. Suvorova, A., Tulupyeva, T. Bayesian Belief Networks in Risky Behavior Modelling // Advances in Intelligent Systems and Computing. Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry”(IITI’16). Springer International Publishing, 2016. pp. 95–102.
14. Toropova, A. Data Coherence Diagnosis in BBN Risky Behavior Model // Advances in Intelligent Systems and Computing. Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry”,(IITI’16). Springer International Publishing, 2016. pp. 95–102.
15. Azarov, A.A., Abramov, M.V., Tulupyeva, T.V., Tulupyev, A.L. Users' of Information System Protection Analysis from Malefactor's Social Engeneering Attacks Taking into Account Malefactor's Competence Profile // Biologically Inspired Cognitive Architectures (BICA) for Young Scientists. 2016. pp. 25–30.
16. Golovina, E., Abramov, M.V., Azarov, A.A. Differentiation of Groundwater Tax Rates as am Element of Improving the Economic Mechanism in the State Groundwater Extraction Management // Biologically Inspired Cognitive Architectures (BICA) for Young Scientists. 2016. pp. 17–24.
17. Tulupyeva, T.V., Tulupyev, A.L., Abramov, M.V., Azarov, A.A., Bordovskaya, N.V. Character Reasoning of the Social Network Users on the Basis of the Content Contained on Their Personal Pages // Biologically Inspired Cognitive Architectures (BICA) for Young Scientists. 2016. pp. 31–38.

Papers Published in Russian Editions Indexed by RSCI

18. Zotov, M.A., Levenec, D.G., Tulupyev, A.L., Zolotin, A.A. Synthesis of the secondary structure of algebraic Bayesian networks: increamental algorithm and statistical estimate of its complexity // Scientific and Technical Gazette Information Technologies, Mechanics and Optics. 2016. Vol. 16, No. 1. pp. 122–132.
19. Romanov, A.V., Zolotin, A.A., Tulupyev, A.L. Synthesis of a quaternary structure of algebraic Bayesian networks: increamental and

decreamental algorithms. // Scientific and Technical Gazette Information Technologies, Mechanics and Optics. 2016. Vol. 16, No. 5. pp. 917-927.
20. Toropova, A.V. Bayesian Belief Networks: a Tool for Education Use // Computer tools in education. 2016. No. 4. pp. 43-53.
21. Abramov, M.V., Azarov, A.A., Tulupyeva, T.V., Tulupyev, A.L. Model of Malefactor Competencies' Profile for Analyzing Information System Personnel Security from Social Engineering Attacks. // Information and Control Systems. 2016. No. 4. pp. 77-84.
22. Ustinov, A.S., Pekoraro, A., Mimiaga, M., O'Klejrih, K., Safren, S.A., Blohina E.A., Verbickaya E.V., YAroslavceva T.C., Lioznov D.A., Suvorova, A.V., Grinenko, A.YA., Zvartau, E.E., Krupickij, E.M., Vudi, D.E. Substance use and depression among patients adherent and non-adherent to antiretroviral therapy // Neurological Bulletin // Neurological Gazette. 2016. Vol XLVIII, Issue 2, pp. 5-11.
23. Abramov, M.V., Azarov, A.A. Social engineering attack modeling with the use of bayesian networks // Proceedings of the International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 71-74.
24. Berezin, A.I., Ivanova, A.V., Zotov, M.A. Synthesis of minimal join graph: statistical evaluation of the complexity of the decremental algorithm// Proceedings of the International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 94-97.
25. Berezin, A.I., Romanov, A.V., Zotov, M.A. 24. Synthesis of the secondary structure of algebraic Bayesian networks: power rating of minimal join graph // Proceedings of the International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 382-385.
26. Zolotin, A.A., Malchevskaya, E.A. Matrix-vector local posteriori inference algorithms in algebraic Bayesian networks over ideals of dizjuncts // Proceedings of the International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 79-82.
27. Romanov, A.V., Levenets, D.G., Zolotin, A.A., Tulupyev, A.L. . Incremental synthesis of the tertiary structure of algebraic Bayesian networks// Proceedings of the International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 27-29.
28. Suvorova, A.V., Tulupyev, A.L. Evaluation of the model for individual behavior rate estimate: Social network data // Proceedings of the

International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 34-37.
29. Toropova, A.V., Suvorova, A.V. Data coherence diagnosis in socially significant behavior model// Proceedings of the International Conference on Soft Computing and Measurements (SCM-2016). St. Petersburg. Volume 1-2. Vol. 1. 2016. pp. 67-70.
30. Berezin, A.I. Set of minimal join graph: examples of use of the software for the C #. // Hybrid and synergistic intelligent systems, materials of the 3-rd All-Russian Pospelovskaya Conference with international participation. Svetlogorsk, June 6-11, 2016. pp. 377-383.
31. Zotov, M.A., Levenets, D.G., Ivanova, A.V., Tulupyev, A.L. Statistical complexity of the synthesis of the secondary structure of algebraic Bayesian networks: two-factor analysis // Hybrid and synergistic intelligent systems, materials of the 3-rd All-Russian Pospelovskaya Conference with international participation. Svetlogorsk, June 6-11, 2016. pp. 405-411.
32. Malchevskaya, E.A., Zolotin, A.A. . Logic-probabilistic inference in ABN: architecture and examples of using of C # software complex // Hybrid and synergistic intelligent systems, materials of the 3-rd All-Russian Pospelovskaya Conference with international participation. Svetlogorsk, June 6-11, 2016. pp. 181-187.
33. Toropova, A.V. Tools for data coherence diagnosis in the model of socially significant behavior // Hybrid and synergistic intelligent systems, materials of the 3-rd All-Russia Pospelovskaya Conference with international participation. Svetlogorsk, June 6-11, 2016. pp. 441-447.
34. Abramov, M.V. The relational model is a probabilistic assessment level calculation protected users from social engineering attacks // 15-th National Conference on Artificial Intelligence with international participation KII-2016. Smolensk, October 3-7, 2016: Conference Proceedings. Vol. 1. Smolensk: Universum, 2016. pp. 203-211.
35. Suvorova, A.V., Tulupyev, A.L. . Structure synthesis of Bayesian belief network based on Poisson behavior model // 15-th National Conference on Artificial Intelligence with international participation KII-2016. Smolensk, October 3-7, 2016: Conference Proceedings. Vol. 3. Smolensk: Universum, 2016. pp. 139-146.
36. Zolotin, A.A., Malchevskaya, E.A., Birillo, A.I., Tulupyev, A.L. Consistency management of estimates of the probabilities in the local posteriori inference in algebraic Bayesian networks // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 52-61.

37. Suvorova, A.V. Risky behavior models for group dinamics monitoring based on small and incomplete observation series// Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 117-120.
38. Toropova, A.V. Diagnosis of data coherence in socially significant behavior modelling// Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp. 620-623.

Other publications

39. Abramov M.V. The approach to estimate of information system's user's protection from social engineering attacks // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 514.
40. Bagrecov, G.I., Azarov, A.A., Tulupyev, A.L. The approach to building user profile vulnerabilities // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 522-523.
41. Berezin, A.I. Synthesis of the secondary structure of algebraic Bayesian networks: pagination of generation algorithm of minimal join graph // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 522-523.
42. Malchevskaya, E.A. Architecture of AlgBNModeller library: alternative representation of knowledge patterns // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 519.
43. Musabirov, I.L., Pozdnyakov, S.I., Bahitova, A.A., Suvorova, A.V. Development of the social system for course gamification with online component // XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 519.
44. Stolyarova, V.F. Copula-based probabilistic graphical models for estimating of threatening behavior rate: last episodes data // The XV

Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 522-523.
45. Suvorova A.V. Social netwok sites as test data source for estimating parameters of socially significant behavior // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 521-522.
46. Toropova, A.V. Analysis of data coherence in extended model for socially significant behavior // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 522.
47. Kharitonov, N.A., Malchevskaya, E.A. Local priori inference in ABN: the automation of the analysis of propositional formula // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 522.
48. Shindarev, N.A., Abramov, M.V. Construction of probabilistic graphical models for estimating the success of socio-engineering attacks // The XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”, St. Petersburg, October 26-28, 2016: Conference Proceedings. St. Petersburg: SPOISU, 2016. pp. 522-523.

Laboratory of Applied Informatics and Problems of Information Society

Head of Laboratory – Corresponding Member of RAS, Dr. Techn. Sci., PhD, Professor, 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 departments at SPSPTU, SPSEEU, Professor of SPSU, SPIIRAS Director Yusupov, Rafael Midhatovich – scientific fundamentals of computer science, informatization problems of society and regions, information and national Security, models' qualimetry. yusupov@iias.spb.su.

Laboratory Staff –16 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 of the Earth, remote sensing and space geoinformatics.

Research Fellows

Chief Researcher Dr. Tech. Sci. PhD Winner of the RF Government Prize, Prof. - Zabolotsky, Vadim Petrovich – 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. PhD, Honored Scientist of the Russian Federation, Winner of the RF Government Prize, Prof. Smokty, Oleg Ivanovich – the theory of radiation transport, 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. PhD Prof. - Soldatenko, Sergey Anatolievich – 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 the-

ory 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. PhD - Sorokin, Leonid Nickolayevich – 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. PhD – Tarakanov, Alexander Olegovich – basic research and mathematical modeling of the principles of information processing by proteins, immunocomputing; sea surface temperature global modeling and forecast in the co-authorship with Mrs. A.V. Borisova. tar@iias.spb.su URL: http://www.researchgate.net /profile/Alexander_Tarakanov/.

Senior Researcher PhD – Blum, Vladislav Stanislavovich – mathematical modeling and analysis of primary medical information flows, as well as problems of security for Public Health. vlad@blum.spb.su.

Senior Researcher PhD - Fedorchenko Ludmila Nickolayevna – syntax-directed data processing; methods and algorithms of grammar regularization; parsing; tools Syntax Graph Transformations. lnf@iias.spb.su.

Senior Researcher PhD – Ivanov, Vladimir Petrovich – 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 PhD Assoc. Prof. – Kharinov, Mikhail Vyacheslavovich – 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

Junior Researcher Khanykov, Igor Georgievich – methods and data structure for image analysis and pattern recognition. igorioniak@mail.ru, igk@iias.spb.su.

Junior Researcher – Usychenko, Alex Sergeevich – modeling the effect of electromagnetic pulse (EMP) on the radio system and the development of methods for estimating the energy characteristics of EMP emitters; nuclear reactors explosion safety research. Spectral analysis and digital signal processing. a.usychenko@gmail.com

Senior Researcher PhD – Perevarukha, Andrey Yurievich – nonlinear dynamics of the models for biological processes. temp_elf@mail.ru.

Senior Researcher twice Winner of the RF Government Prize, PhD – Vus, Mikhail Alexandrovich – 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.

Grants and Projects

Grant of the Russian Foundation for Basic Research No.16–29–09482. "Forecasting information network of terrorist threats and justification of measures to counter them in megacities", 2015–2016. (Yusupov R.M.).

Grant of the Russian Foundation for Basic Research No.14–07–00066. “Development of methods for the computational modeling of formation of stocks of living aquatic resources when artificial reproduction technology adaptation”. (Perevarukha A.Yu).

Grant of the Russian Foundation for Basic Research No.16–17–20004. “Dynamic chaos as a feature of computational experiments and problems of its interpretation of the essential models of biological processes”. (Perevarukha A.Yu).

Grant of the Russian Foundation for Basic Research No.15-04-01226. “Periodic fluctuations in the long-term population dynamics of phytophagous: insects inductors and mechanisms”. (Perevarukha A.Yu).

University Courses

The Head of basic departments: “Information technology and computer security” (St. Petersburg Electrical Engineering University 'LETI' - SPSEEU), "Distributed Intelligent systems of automation" (St.Petersburg State Polytechnic University– SPSPTU), Professor of Computer Science Department (Math.-Mech. Faculty, SPb State University - SPSU). Seminars, and survey lectures at SPSEEU and SPSUAI. The Chairman of the Doctoral dissertation Council at SPIIRAS. - Yusupov R.M.

SPSUAI: Department No.82. Lectures of Assistant Professor: "Information Technology in Business", "Information Search System", "Linguistic Support of Information Systems", "Intelligent information systems" - Blum V.S.

SPSUAI: basic Department of robotics: Lectures of Assistant Professor “Base Studies in Robotics”, “Control robots and robotic systems”, “Software telemedicine networks. SPSUITMO – Ivanov, V.P.

SPSU: Math.-Mech. Faculty. Department of Computer Science. Lectures of Assistant Professor :”Theory of Automata and Formal languages”, Practice on Object-Oriented Programming in C++. – Fedorchenko, L.N.

SPSPTU: 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 (Nuclear Power Plant) staff and population from radiation", "Security management of natural and technical systems”, “Managing of emergency response to radiation and chemically dangerous objects”. – Sorokin, L.N.

Conferences

XV Jubilee St. Petersburg International Conference "Regional Informatics (RI – 2016)", October 26–28, 2016, St. Petersburg. (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://spoisu.ru/conf/ri2016

International scientific-practical conference "Theoretical and applied aspects of information security." // Law on State Secrets and Official Secrets in the CSTO states. Minsk, Academy of the Ministry of Internal Affairs of the Republic of Belarus. March 31, 2016 – Yusupov, R. M., Vus, M. A.

VI International Scientific and Practical Conference "Law and Information: Theory and Practice", April 15, 2016, St. Petersburg – Yusupov, R. M., Vus, M. A.

35-th International Conference "School Informatics and problems of sustainable development." St. Petersburg, April 21–23, 2016 – Vus, M. A.

The third forum of young teachers in Tikhvin sity, (Russia), "Teacher of the future." All-Russian Pedagogical Assembly, Tikhvin, 1–2 July 2016 – Vus, M. A.

Information and Analytical Center of the CSTO Parliamentary Assembly. //. The work on the draft Model Law CSTO "On State Secrets". St. Petersburg, April 5, 2016 – Vus, M.A.

Expert Council of the CSTO PA. // About CSTO Model Law "On State Secrets", St. Petersburg, April 5, 2016 – Vus, M. A.

International Conference "Manned space exploration", May 24–26, 2016, Korolev (Russia). – Smoktiy, O.I.

International Conference on Computer Science and Applications, (ICCSA'2016), July 4–9, 2016, Beijing, China. – Smoktiy O.I.

XI All-Russian scientific-practical conference "Problems of explosion protection and counter-terrorism", April 12–14, 2016, St. Petersburg – Sorokin, L.N.

XXVI International Conference «EMECS 11 – Sea coast", August 22–27, 2016, St. Petersburg – Soldatenko, S.A.

VI International Conference of the World Meteorological Organization, "Influence of various observing systems on numerical weather forecast", May 10-13, 2016, Shanghai, China – Soldatenko, S.A.

International Symposium "Data Assimilation", December 5–9, 2016, Melbourne, Australia – Soldatenko, S.A.

VIII All-Russian Conference "Actual Problems of Applied Mathematics and Mechanics" dedicated to the memory of Academician A.F. Sidorov. Yekaterinburg: IMM UB RAS, September 4–11, 2016 – Perevarukha, A.Yu

International scientific conference "Theory of operators, a comprehensive analysis and mathematical modeling" // Model of formation of generations with a variable rate of growth in the early ontogeny, Divnomorskoe, September 7–14, 2016 – Perevarukha, A.Yu.

The 9-th Conference «Information Technology in Control (ITC–2016)» in the frame of the 7-th Russian multiconference on the problems of control (RMCCP–2016), October 4–6, 2016, St. Petersburg. http://www.elektropribor.spb.ru/mkpu2016 http://conference.spiiras.nw.ru/itu2016/ –(Yusupov, R. M., Zabolotsky, V. P., Blum, V.S., Fedorchenko, L. N., Ivanov, V.P., Kharinov, M.V., Khanykov, I.G.

XII International Conference "Applied Optics 2016 (PO-2016)", November 14-18, 2016. St. Petersburg – Kharinov, M. V.

9th International Conference on Security of Information and Networks (SIN 2016) July 20–22, 2016. Rutgers University, New Jersey, USA. Report «Criteria and Indices of Computer Network Protection» – Fedorchenko, L. N.

11th International Computer Science Symposium in Russia (St. Petersburg), June 9–15, 2016 – Fedorchenko, L. N.

7th seminar «Program Semantics, Specification and Verification», June 14–15, 2016. St. Petersburg – 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 according to the plans of the IPA CIS and CSTO PA. – Vus, M.A.

Scientific and organizational activities

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 of simulation – Yusupov R. M.

Organization and holding of the XV Jubilee St. Petersburg International Conference "Regional Informatics (RI–2016)", October 26 – 28, 2016, St. Petersburg (http://spoisu.ru/conf/ri2016) – Yusupov, R. M., Zabolotsky, V.P. , Fedorchenko, L.N.

9th Conference "Information Technologies in Control (ITC–2016)" at the 7th Russian multiconference management problems (RMCCP-2016), October 4–6, 2016, St. Petersburg. Web sites: http://www.elektropribor.spb.ru/mkpu2016 http://conference.spiiras.nw.ru/itu2016/ – Yusupov, R. M., Fedorchenko, L. N.

Membership in Domestic and International organizations, editorial boards of journals, etc.

Yusupov, R.M. – Member of the RAS Bureau of Department on Nano and Information Technologies; Member of Scientific Council of RAS “Scientific Telecommunications and Informational Infrastructure”; Member of RAS Scientific Council on Theory of Control Process and Automatization; Member of Russian National Committee on Industrial and Applied Mathematics; Member of Scientific Council attached to the Russian Security Council of Russia Federation; 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 Presidium of the St. Petersburg Scientific Center of RAS; the Chairman of Integrated Scientific Council of this Center on Computer Science, Telecommunication, and Control; Vice-chairman of Scientific Council on Informatization at St. Petersburg Government; Honorary Doctor of Petrozavodsk State University; Honorary member of the St. Petersburg Academy of Management and Economics; President of the National Society of simulation; 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", “Mephatronics, 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.

Zabolotsky, V.P. – Scientific Secretary of St. Petersburg series conferences “Information Security of Russian Regions” and “Regional Informatics”.

Fedorchenko, L.N. – Scientific Secretary of the SPIIRAS ongoing city seminar "Informatics and Computer Technologies." Web site: http://www.spiiras.nw.ru/rus/conferences/ict/r2016.htm.

Ivanov, V.P. – Corresponding Member of the Russian 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 the member of the All-Russian Central Executive Committee of Pedagogical Assembly and the 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).

Participation in the promotion of scientific knowledge and achievements

Popular scientific article "Dynamic chaos as a feature of computational experiments and problems of its interpretation of the essential biological processes in the models": Collection of popular science articles and photographs – winners of he RFBR grants in 2016. Issue 19. Edited by V.A. Shahnova, Moscow: ITC MOLNET, 2016, pp. 252–265. – A.Yu. Perevarukha.

Patents for inventions and utility models

Invention patent number 2573671 of December 22, 2015 on the application 2014128136/28 07.09.2014, the method and apparatus for dynamic calibration of pressure sensors (Mochalov. V.V., Grishchenko, S.A., Nesterov, A.G, Sorokin, L.N.). Bulletin number 3 of 27.01.2016.

Recent results

1. The problem of optimal control of the Earth's climate system as a complex adaptive dynamical system has been formulated. Special method for selecting control parameters in optimal control unstable geophysical trends and a model of the climate system model and assess

the impact of the various classes of observations on the quality of forecasting trajectories of dynamical systems have been developed too. [2–6,8,9].

2. A numerical and analytical model of accumulation of heat in the microwave semiconductor devices under the influence of powerful sequence of electrical pulses developed. There has been experimentally studied silicon transistors burn when exposed to electric pulses. It is found that a catastrophic failure occurs when the melting point of silicon. However, it was required additional heat that spent low temperature melting eutectics. The boundaries of the practical application of the developed analytical model were defined [24, 25].

3. Numerical models of the radiation fields of natural environments based on the use of the principle of mirroring and solutions of linear integral equations of the singular have been received. The theory of the formation of weak spectral lines of the system "atmosphere – the underlying surface," was built. The theory has took into account the polarization of scattered radiation. New structural functions for atmospheric radiation field based on the use of the principle of mirroring was identified. [18].

4. The comparative analysis of the status and practices of the national legislation of States – members of the Collective Security Treaty Organization in the sphere of protection of state secrets has been done. A draft of the Model Law of the CSTO "On State Secrets" was developed. [45–50].

5. A dynamic model of the flow of clinical health information was developed. Also the method of database visualization of integrated electronic health records has been realized. [19–22].

6. A dynamic model of the scenario of rapid degradation of the population of fish cod (Gadus morhua) of numerous stable condition after treatment of unstable aperiodic fluctuations was developed. This simulated situation was suddenly realized in 1992 in the North Atlantic. It led to the ongoing moratorium on fishing, when just before the collapse of the state of stocks of cod was estimated by experts as quite safe. Based on the previously reviewed the situation of the Caspian Sea sturgeon proposed generalized model of the collapse phenomenon [36–43].

7. In collaboration with scientists at the Karolinska Institute (Stockholm, Sweden) for the first time was found that serotonin receptors can bind to immune receptors, and the mechanisms by which this occurs binding receptors are present in marine sponges – the most ancient animals. This discovery may lead to new drugs for the treatment of major depressive disorder. These results are published in the journal Trends in Neurosciences, and also in the press release of 11/03/2016 FANO [17].

8. The technique of intelligent data processing has been developed. Data are presented in a text format (document file) with a view to their harmonization on a semantic level. The technique is based on attributes in translational CFR grammar. Attributes (as predicate and semantics) are entered directly into the text of grammar or syntax graph-scheme and are translated into predicate functions and semantic procedures without parameters, creating computing environment. This approach was further amplified. [12, 13, 26].
9. A network dynamic data structure for the selection of objects in digital images in terms of cyclic and acyclic graphs (Dynamic trees Sleytora-Tarjan) was developed. It is supported by the RAM reversible operations with millions of objects detected by the computer and provides improved error for approximating any hierarchical image segmentation, and the acceleration of computing at least 100 times. A method for improving any hierarchical clustering pixels of color image has been suggested.[29,31,58].
10. New scientific result has been received. It is a method of synthesis of the executive of robotics and automation devices on the swellable polymer. The proposed method was implemented in two pilot projects [33–35].

Awards

Smoktiy, O. I. – Order of Honour for a significant contribution into development of science, education, training of highly qualified professionals and many years fruitful professional activity. Presidential Decree of January 29, 2016

Vus, M. A. – Commemorative Badge “70 Years of the National Security Institute, Republic of Belarus”.

References

Books In Russian Publishing Houses

1. The strategic vector of ensuring international information security. Collector of articles // [by M.A Vus, O.S Makarov] / Prefaced by Corresponding Member of RAS R.M. Yusupov. – SPb.: SPIIRAS. Publishing house "Anatolia". 2016. – 122 p.

Papers Published in Editions Indexed by WoS, Scopus.

2. Soldatenko, S., Yusupov, R. Predictability in deterministic dynamical systems with application to weather forecasting and climate modeling. In: Dynamical Systems and Differential Equations. M. Reyhanoglu (ed.), In Tech Publ., Rijeka.
3. Soldatenko, S., Chichkine, D. Climate model sensitivity with respect to parameters and external forcing. In: Topics in Climate Modeling. T. Hromadka, P. Rao (Eds.), Rijeka, 2016, pp. 105–135.

4. Soldatenko, S. Weather and climate manipulation as an optimal control for adaptive dynamical systems // Complexity. 2016, Article ID 4615072, 14 p.
5. Soldatenko, S. Sensitivity of unstable eigenmodes to parameters in a linearized geophysical flow model //Applied Mathematical Sciences, Vol. 10, No. 25, 2016, pp. 1201–1209.
6. Soldatenko, S., Yusupov, R. The determination of feasible control variables for geoengineering and weather modification based on the theory of sensitivity in dynamical systems // Journal of Control Science and Engineering. 2016. Vol. 2016. Article ID 154762, 9 p.
7. Soldatenko, S., Alekseev, G., Danilov A. Observation impact assessment for dynamic data-driven coupled chaotic system // Applied Mathematical Sciences, Vol. 10, No. 45, 2016, pp. 2239–2248.
8. Soldatenko, S., Alekseev, G., Danilov, A. A modeling system for climate change risk assessment, management and hedging in coastal areas // Proceedings of the XXVI International Conference «EMECS'11 – Sea Costs», St. Petersburg August 22–27, 2016, 10 p.
9. Soldatenko, S.A., Yusupov, R.M. On the choice of the control parameters in the simulation of purposeful modification of weather and climate processes // Proceedings SPIIRAS. 2016. Vol. 1 (44). pp.153–180.
10. Perevaryukha, A.Yu. An iterative continuous-event model of the population outbreak of a phytophagous Hemipteran // Biophysics. 2016. Vol. 61. Issue 2. pp. 334–341.
11. Perevaryukha, A.Yu. Modeling Abrupt Changes in Population Dynamics with Two Threshold States // Cybernetics and Systems Analysis. 2016. Vol. 52, Issue 4. pp. 623–630.
12. Vorobiev, V.I., Evnevich, E.L., Levanevski, D.K., Fatkieva, R.R., Fedorchenko, L.N. Research and selection of standards-based cryptographic smart document analysis // Proceedings SPIIRAS. 2016. Vol. 48. pp. 69–87.
13. Vladimir Vorobiev, Elena Evnevich, Roza Fatkieva, Ludmila Fedorchenko, Dmitriy Levonevskiy Criteria and Indices of Computer Network Protection. July 2016 SIN '16: Proceedings of the 9th International Conference on Security of Information and Networks.
14. Tarakanov, A.O., Borisova, A.V. Sea surface temperature simulation and forecast. // International Journal of Parallel, 2016. Emergent and Distributed Systems 31: pp. 143–151.

15. Borroto-Escuela, D.O., Tarakanov, A.O., Fuxe, K. FGFR1–5–HT1A Heteroreceptor complexes: implications for understanding and treating major depression. 2016. Trends in Neurosciences 39: pp. 5–15.
16. Tarakanov, A.O., Borisova, A.V. Immunocomputing and Baltic indicator of global warming. // In: Adamatzky, A. (Ed.) Advances in Unconventional Computing Vol. 23 (of the series Emergence, Complexity and Computation), Springer, Switzerland, 2016, pp. 763–771.
17. Perez de la Mora, M, Pérez-Carrera, D, Crespo-Ramírez, M, Tarakanov, A.O., Fuxe K., Borroto-Escuela, D.O. (2016) Signaling in dopamine D2 receptor-oxytocin receptor heterocomplexes and its relevance for the anxiolytic effects of dopamine and oxytocin interactions in the amygdala of the rat. Biochimica et Biophysica Acta – Molecular Basis of Disease 1862: 2075–2085.
18. Smokty, O. Analytical spatial – angular structure of uhiform slab radiation fields for strongly elongated phase functions. Computational Science and its Applications – ICCSA'2016, Lecture Notes in Computer Sciencs, Part 1, Springer, Berlin, 2016, pp.110–128.

Papers Published in Russian Editions Indexed by RSCI

19. Blum, V.S. Zabolotsky, V.P. Visualization Method of information flow in the clinical health care. //Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. – pp.142–151.
20. Blum, V.S. Zabolotsky V.P. Dynamic model of informational events in clinical healthcare. //XV Jubilee St. Petersburg International Conference "Regional Informatics (RI–2016)." St. Petersburg, October 26–28, 2016. // Proceedings of the conference. SPOISU.– SPb, 2016. pp.313–318.
21. Blum, V.S. Zabolotsky, V.P. Classification of software agents for the early detection of defects of care according to an integrated electronic medical record. // Management of economic systems: electronic scientific journal. 2015. No.12.
22. Blum, V.S. Zabolotski, V.P. Clinical health care model and the impact of legislation on informatization. // Mathematical Morphology: electronic scientific journal. 2016. No. 2.
23. Vus, M.A. Bookshelf (reviewing). // Informatization and Communication. No. 2/2016. pp. 146–152.
24. Usychenko, V.G. Sasunkevich, A.A., Sorokin, L.N. Model burnout microwave semiconductor devices under the influence of a periodic sequence of electrical pulses. // Technology and Electronics. 2016. Vol. 61. No. 5. pp. 484–493.

25. Sasunkevich, A.A., Sorokin, L.N., Usychenko, V.G. Experimental study of burnout microwave bipolar transistors under the influence of a sequence of electrical pulses. // Technology and Electronics. 2016. Vol. 61. No. 7. pp. 702–710.
26. Fedorchenko, L.N. The theory of types, computer algebra, proof assistants and grammar. // Vestnik of the Buryat State University. // No. 2, Ulan-Udeh: Publishing House of the Buryat State University, 2016. pp. 55–76. ISSN 2304–5728.
27. Fedorchenko, L.N., Slyozkin, N.E. Algoriths for developing of parser's states for CFR-language. // Printed materials of the 9-th conference "Information Technologies in Control" (ITC-2016) – SPb: "Concern "CNII "Electropribor"", 2016. pp.109–116. ISBN 978–5–91995–7.
28. Kharinov, M.V. Fundamentals of the model of quasi-optimal approximations image // Vestnik of the Buryat State University, Mathematics and Informatics / No 1, Ulan-Udeh: Publishing House of the Buryat State University, 2016. – pp. 60–72.
29. Kharinov, M.V. The development of information technology of low-level machine vision // Printed materials of the 9-th conference "Information Technologies in Control" (ITC-2016) – SPb: "Concern "CNII "Electropribor"", 2016. – pp. 857–863.
30. Zabolotsky, V.P. Kharinov, M.V. Segmentation of the digital image. // Management of economic systems: electronic scientific journal, 2015. No. 12 (84). pp. 20.
31. Zabolotsky, V.P., Kharinov, M.V. Technology quasioptimal machine vision. Economic systems management: an electronic scientific journal, 2015. No. 12 (84). pp. 23, http://uecs.ru/ index.php?option=com_flexicontent&view=items&id=3891:2015–12–30–14–02–03
32. Ivanov, V.P. Evaluation of the possibility of using solar energy to fly unmanned aircraft." pp. 231–235 // Proceedings of the military-scientific conference "Robotics of the Armed Forces" – M.: Ministry of Defense of the Russian Federation. 470 p.
33. Ivanov, V.P. The method of optimal control synthesis for autonomous dynamic systems." pp.358-365 / Proceedings of the military-scientific conference "Robotics of the Armed Forces" – M.: Ministry of Defense of the Russian Federation. 470 p.
34. Ivanov, V.P., El'yashevich, G.K., Dmitriev, I.Y. Artificial muscles on swellable polymer as a model of muscular system of biomechanical systems // Russian Journal of Biomechanics, 2016, No. 12.

35. Dmitriev, I.Y., Bobrova, N.V., Zoolshoev, Z.F., Kuryndin, I.S., El'yashevich, G.K. Ivanov, V.P. Hybrid hydrogels based on cross-linked polyacrylic acid and polyvinyl alcohol as an electrically-controlled artificial muscles / Journal of Applied Chemistry. 2016. T. 9. Vol. 11, pp. 55.
36. Perevarukha, A.Ju. Degradation of commercial fish stocks: the experience of scenario modeling (on example of the North Atlantic cod) // Bulletin of Irkutsk State University. 2016. Vol. 15. A series of "Biology. Ecology". pp. 55–67.
37. Perevarukha, A.Ju. Modification of the model reproduction of sturgeon stocks at their inconstancy growth rates of juvenile // Ecological systems and devices. 2016. No. 3. pp. 25–34.
38. Perevarukha, A.Ju. The development of computational models of sturgeon reproduction of the analysis of structural relationships in ecosystem processes // Proceedings of the Institute of Mathematics and Computer Science Udmurt State University. 2016. Vol. 1 (47). pp. 34–43.
39. Perevarukha, A.Ju. Analysis of patterns of reproduction of commercial fish species with nonlinear interpretation of observational data // Bulletin of Samara Scientific Center of the Russian Academy of Sciences. 2016, Vol.18. No. 1. pp. 101–108.
40. Perevarukha, A.Ju. The collapse of fish stocks and its dynamic model // fisheries. Vol. 17, No. 3. 2016. pp 358–367.
41. Perevarukha, A.Ju. System analysis of the changes of rare processes with aperiodic boundary regime and crisis attractor // Modern technologies. System analysis. Modeling. 2016. No. 2 (50), pp. 95–101.
42. Perevarukha, A.Ju. Nonlinear model of overfishing Volga population count based on cognitive interaction of environmental factors // Bulletin of Samara University. The natural science series. 2016. No. 1. pp. 92–106.
43. Perevarukha, A.Ju. On the criteria for the validity of the analysis of non-linear effects in models of exploited populations // Problems of Mechanics and Control. Non-linear dynamical systems. 2016. Vol. 48. pp. 74–83.
44. Khanykov, I.G. A software module for automatic selection of objects .// Information Technologies in Control (ITU–2016) // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016.

Other Publications

45. Vus, M.A. Management problems geopolitical information confrontation (review) // Geopolitics and Security. No. 2 (34), 2016.
46. Yusupov, R.M., Bachilo, I.L., Bondurovsky, V.V., Vus, M.A., Makarov, O.S. The experience of international scientific cooperation in the development of model legislation on the basis of the CIS IPA // Collections Presidential Library. A series of "e-law", Vol. 5. SPb.: Presidential Library, 2015 pp. 94–98.
47. Vus, M.A., Makarov, O.S. On the question of the model law "On State Secrets" // Jurisprudence: problems and prospects: materials of IV Intern. Scientific. Conf., Kazan, May, 2016. Kazan: Beech, 2016. pp. 105–109.
48. Vus, M.A., Makarov, O.S. The strategic vector of ensuring international information security in the CIS // Jurisprudence: problems and prospects: materials of the V Intern. Scientific. Conf. Kazan, October, 2016. Kazan: Beech, 2016. – pp. 40–43.
49. Vus, M.A., Kondratyev, V.V. On the question of the development of the model law "On State Secrets" to CSTO] // Actual problems of law: V materials Intern. Scientific. Conf. Moscow, December, 2016. M: Buki, Vedi, 2016, pp. 29–34.
50. Vus, M.A. State secrets and state secrets // "INFOFORUM–2016." Section No. 2 issues of international information security and legal regulation in the sphere of information security. Moscow, February 4-5, 2016. Web site: http://infoforum.ru /konferenciia?cid=20].
51. Ivanov, V.P., Dmitriev, I.M., El'yashevich, G.K. "Experimental agent on swellable polymers (physical model)" // Printed materials of the 9-th conference “Information Technologies in Control” (ITC-2016) – SPb: “Concern “CNII “Electropribor””, 2016. pp.168-172.
52. Ivanov, V.P. The regression estimate socio-economic aspects of security EAEC // Proceedings of the XV Jubilee St. Petersburg International Conference "Regional Informatics (RI–2016)” St. Petersburg, October 26-28, 2016 – St. Petersburg, 2016.
53. Lukyanova, L.M., Fedorchenko, L.N. The formalization of grammars, and language’ problems, and objectives of integrated systems of industrial sphere. // XV Jubilee St. Petersburg International Conference “Regional Informatics (RI–2016)”. St. Petersburg, October 26–28, 2016.: Conference materials. SPOISU.– SPb, 2016. – 599 p.
54. Svinyin, S.F., Alekseev, A.V., Popov, A..I Fedorchenko, L.N. Information Theory: from the Whittaker–Nyquist–Shannon to infor-

mation space control theory. // XV Jubilee St. Petersburg International Conference "Regional Informatics (RI–2016)." St. Petersburg, October 26–28, 2016.: Conference materials. SPOISU.– SPb, 2016. pp. 49.
55. Lukyanova, L.M., Zabolotski, V.P., Fedorchenko, L.N. Two problems of formation of the goals of the system: analysis and synthesis purposes. // XV Jubilee St. Petersburg International Conference "Regional Informatics (RI–2016)." St. Petersburg, October 26–28, 2016. Conference materials. SPOISU.– SPb, 2016. pp. 288.
56. Panarina, A.V., Basenko, V.G., Sorokin, L.N. The energy contribution of zirconium-steam reaction in the heat balance of the VVER fuel element in an accident with loss of coolant / X All-Russian scientific-practical conference "Problems of explosion protection and counter-terrorism", April 22–24, 2015. SPb .: 2016. pp. 92–98.
57. Sorokin, L.N., Basenko, V.G., Panarin, A. Simulation of the evolution of hydrogen in a nuclear reactor VVER in an accident with loss of coolant // Proceedings of the XI All-Russian scientific-practical conference "Problems of explosion protection and counter-terrorism" on April 12–14, 2016. – SPb.
58. Kharinov, M.V. Averaging and ordering of colors in the image // Applied Optics 2016 (PO–2016). XII Int. Conf. St. Petersburg. November 14–18, 2016: Conference Proceedings. St. Petersburg: Optical Society. DS Christmas, 2016. Vol. 3. pp. 76–80.
59. Vus, M.A., Yusupov, R.M. Laws on state secrecy and state secrets makes in the organization of the State Treaty collective security. \\ Procs. of International scientific-practical conference (MIA Academy of Belarus Republic, Minsk, March 31, 2016). pp. 60–63. ISBN 978-985-576-024-6.
60. Shishkin, V.M. The effects of the duality of security threats countering and their evaluation. \\ Procs. of International scientific-practical conference (MIA of Belarus Republic, Minsk, March 31, 2016. pp. 297–301. ISBN 978-985-576-024-6.

Scientific-Research Department of Information Security Problems

Head of Department: Dr. Tech. Sci. PhD Prof. Alexander A. Moldovyan, deputy director for information security – investigation and development of the algorithms and means for information protection. maa1305@yandex.ru

Department Staff – 9 members and 3 PhD students.

SRD ISP includes 2 scientific-research laboratories: cryptology laboratory and information systems security laboratory.

Head of the Cryptology Laboratory: Dr. Tech. Sci. PhD Honored Inventor of the Russian Federation Prof. 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: Ph. D. Roman Sh. Fakhrutdinov – investigation and design of the algorithms and means for information protection, certificate testing, computer-technical expertise.

Research Fellows

Senior Researcher PhD – Anatoliy Yu. Mirin – investigation and design of the algorithms and means for information protection, certificate testing, computer- technical expertise.

Researcher PhD – Alexandr A. Goryachev – investigation and design of the algorithms and means for information protection.

Researcher PhD – Dmitriy M. Latyshev – investigation and design of the algorithms and means for information protection.

Senior Researcher – Andrey P. Zabolotnyi – investigation and development of the algorithms and means for information protection, networking problems of information systems, 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.

Post-graduate Students

Nikolay Babadzhanyan – functionality extention of the digital signature standad GOST R 34.10–2012 (supervisor Moldovyan, N.A.)

Anton V. Muraviov –security investigation of the encryption algorithms with sort-size keys (supervisor Moldovyan, A.A.)

Zhan A. Solnyshkin – error correction properties of block ciphers. (supervisor Moldovyan, N.A.)

Grants and Projects

RFBR Grant No. 14-07-00061-a “New methods, algprithms and applications of the deniable encryption for information security in information-telecommunication systems” (2014-2016), Principal Investigator Moldovyan, N.A.

University Courses

SPSEEU: 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.)

Military Space Academy: Mathematic basis of Cryptography (Moldovyan, N.A.)

Conferences

International conference “The 18th FRUCT & ISPIT Conference”, April 18-22, 2016, St. Petersburg, Russia (Moldovyan, A.A., Moldovyan, N.A.)

Workshop on Foundations of Informatics, July 25-29, 2016, Chisinau–(Moldovyan, A.A., Moldovyan, N.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.

Intellectual Property Registered in the Reporting Year

Berezin, A.N., Moldovyan, D.N., Moldovyan, N.A. A method for encrypting a message represented as a lage-size binary number // Patent for the invention No. 2580060. Posted: 10.04.2016. Bull. No.10.

Recent Results

1. It has been designed a method for fast deniable public encryption which uses standard public key infructructure [1, 4].
2. Protocols for threshold pseudo-probabilistic encryption [7].
3. No-key protocols for deniable encryption [5,10].

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].

References

Papers Published in Editions Indexed by WoS, Scopus

1. Moldovyan, N.A. Berezin, A.N., Kornienko, A.A., Moldovyan, A.A., Bi-deniable Public-Encryption Protocols Based on Standard PKI // S. Balandin, A. Levina, T. Tyutina (Eds.), Proceedings of the 18th FRUCT & ISPIT Conference, April 18-22, 2016, Technopark of ITMO University, St. Petersburg, Russia. FRUCT Oy, Finland. ISSN 2305-7254, ISBN 978-952-68397-3-8, pp. 212—219.
2. Moldovyan, N.A., Moldovyan, A.A., Shcherbacov, V.A. Generating Cubic Equations as a Method for Public Encryption// Buletinul Academiei de Stiinte a Republicii Moldova. Matematica. 2015. No. 3 (79). pp. 60-71.
3. Moldovyan, N.A., Moldovyan, A.A., Berezin, A.N. On Using Mersenne Primes in Designing Cryptoschemes // Int. Journal of Network Security. 2016. Vol. 18, No. 2, pp. 369-373.

Papers Published in Russian Editions Indexed by RSCI

4. Moldovyan, N.A., Mikhteev, M.S., Nguyen, Kim Tuan. Deniable public encryption protocol including authentication procedure // Questions of information security. 2016. No. 3. pp. 9-15.
5. Moldovyan, N.A., Shcherbacov, A.V. No-key deniable encryption protocol // Questions of information security. 2016. No. 2. pp. 9-14.
6. Moldovyan, A.A., Galanov, A.I., Sinev, V.E. Group signature: new protocols // Questions of information security. 2016. No. 2. pp. 44-50.
7. Moldovyan, N.A., Shapovalov, P.I. Protocols for threshold public encryption // Questions of information security. 2016. No. 3. pp. 3-8.

Other Publications

8. Moldovyan, N.A., Shcherbacov, A.V., Shcherbacov V.A. Some applications of quasigroups in cryptology // Computer Science Journal of Moldova. 2016. Vol.24. No. 1(70). pp. 55-67.
9. Moldovyan, N.A., Moldovyan, A.A., Moldovyan, D.N., Shcherbacov, V.A. Stream Deniable-Encryption Algorithms // Computer Science Journal of Moldova. 2016. Vol.24. No. 1(70). pp. 68-82.
10. Moldovyan, N.A., Moldovyan, A.A., Shcherbacov, A.V. Deniable-encryption protocol using commutative transformation // Workshop on Foundations of Informatics, July 25-29, 2016, Chisinau, Proceedings, pp. 285-298.

Department of Graduate School Information and Educational Technologies and Services

Head of Department: Senior Researcher Ph.D. Assoc. Prof. Vladimir Salukhov – information technology in education, life-cycle management infotelecommunication systems analysis and development of support systems and decision-making on the basis of modern information technologies; visal@iias.spb.su.

Department Staff – 19 members.

Research Activities

Information technology in education and development of a joined educational space data processing center of remote sensing (RS); computer science and educational center of SPIIRAS. Analysis of free software and its usage in research and educational centers. Modeling and automation of info telecommunication systems management processes. Application of multi-criteria methods of statistical analysis for building corporate expert systems, including medical institutions.

Research Fellows

Professor PhD Prof. – Andrey Mironov – research and development of methodological and methodical principals of solving the structural and functional synthesis of intelligent information technologies and systems' monitoring states of complex technical objects, operating in real timescale factor under the conditions of rapidly changing environment, mironov-anik@yandex.ru.

Professor PhD Prof. – Vladimir Bubnov – development of methodological aspects of building automated systems for monitoring the technical condition of artificial structures; transient queuing systems, bubnov1950@yandex.ru.

Professor PhD – Tatiana Kholostova – research and practical implementation of innovative educational technologies in studying of foreign languages, kholostova@yandex.ru.

Associate Professor PhD Assoc. Prof. – Vladimir Soldatenko – information technologies in education; management of infotelecommunication systems life-cycle; analysis and development of technologies for complex organizational and technical systems, soldatenko_vs@mail.ru.

Associate Professor PhD Assoc. Prof. – Olga Plebanek – philosophy of science; postnonclassical cognitive practices; philosophy of culture; civilization studies; nonlinear processes in social dynamics, plebanek@mail.ru.

Associate Professor PhD Assoc. Prof. – Irina Igorevna Shatilova– research of modern trends in pedagogy and psychology in different social environments, irinsh1808@gmail.com.

Senior Researcher Ph.D. Assoc. Prof. – Victor Kasatkin– information technology in education; information systems and technologies, v.v.kasatkin@mail.ru.

Researcher PhD, Assoc. Prof. – Valery Matyash – development of methods and models of representation and processing of big volume of data for monitoring the state of complex objects, vam@aanet.ru.

Researcher – Anna Motienko – robots; emergency-rescue robots; human-computer interaction; transportation of injured people; first aid; search-and-rescue works; emergency situation; Bayesian trust networks, anna.gunchenko@gmail.com.

Junior Researcher – Sergey Rogachev – methods and algorithms of the development of integrated systems of land-space flood monitoring, rogachev.seal@gmail.com.

Applicants for a degree

Motiyenko, Anna Igorevna – Models and methods of decision-making support for the emergency rescue of the affected in consequence of accidents at hazardous manufacturing entity. Supervisor – PhD Basov, O.O.

Rogachev, Sergey – Research and development of intelligent systems of integrated ground-space monitoring and flood forecasting. Supervisor – PhD Matyash, V.A.

University Courses

SpBSTU: cognitive multi-agent systems (Salukhov, V.I.)

SpBSSU: Informatics (Motiyenko, A.I.)

SPbSUAI: Structure and data processing algorithms (Matyash, V.A., Rogachyov, S.A.)

SPIIRAS: Higher School Pedagogy (Shatilova, I.I.)

SPIIRAS: History and Philosophy of Science (Plebanek, O.V.)

SPIIRAS: English language in scientific discourse (Kholostova, T.D.)

Conferences

XV International Conference “Regional Informatics (RI-2016)”, October 26-28, 2016, St. Petersburg – Kasatkin, V.V., Salukhov, V.I, Soldatenko, V.S.

The 9th Conference “Information Technologies in Control (ITC-2016)”, October 4-6, 2016 St. Petersburg – Salukhov, V.I.

The 2nd Interregional Theoretic and Practical Conference “Advanced Lines of Development in National Information Technologies”, September 13-17, 2016, Sevastopol – Kasatkin, V.V., Salukhov, V.I.

The First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16), May 16-21, 2016, Rostov-on-Don – Sochi – Motienko, A.I.

The 13th International Symposium on Neural Networks (ISNN 2016), July 6-8, 2016, St. Petersburg, Russia – Motienko, A.I.

The 1st International Conference on Interactive Collaborative Robotics (ICR 2016), August 24-26, 2016, Budapest, Hungary – Motienko, A.I.

Military and scientific conference “Robotization of the Military Establishment of the Russian Federation”, February 10, 2016, Moscow – Motienko, A.I.

All-Russian scientific-practical conference “Problems of Creation and Application of Small Satellites and Robotic Means in the Interests of the Russian Federation Military Establishment”, April 12-13, 2016. St. Petersburg – Motienko, A.I.

The XXIXth International Conference “Mathematical Methods in Engineering and Technology” (MMET – 29), May 31 - June 3, 2016, St. Petersburg – Motienko, A.I.

The XVIth Conference on Space Biology and Medicine with International Participation, December 5-8, 2016, Moscow – Motienko, A.I.

All-Russian scientific-practical conference “Information systems and Technologies in Modeling and Management”, May 23-24, 2016, Simferopol’ – Kasatkin, V.V.

International scientific conference “Soviet Culture in World History”, November 18-19, 2016 St. Petersburg – Plebanek, O.V.

Interuniversity scientific-practical conference “Novelty in Linguistics and Methods of Teaching Foreign and Russian languages”, “Modern Technology in the Process of Teaching Foreign Language” June 08, 2016, St. Petersburg – Kholostova, T.D.

Membership in the Russian and international organizations, editorial boards, etc.

Saluhov, V.I. – member of the Editorial Board WORLD TELECOM

Intellectual Property Registed in the Reporting Year

Programs and Data Bases

The certificate of the Federal Service for Intellectual Property of the State of database registration No.2016620096 from 02.20.2016, Khimenko, V.I., Zelentsov, V.A., Matyash, V.A., Rogachyov, S.A. “The Base of Remote Sensing Data Spacecraft SUOMI NPP – Northwest Aerospace Monitoring Center”.

Certificate on Software Registration No. 2016619548 of the Federal Service for Intellectual Property, Patents and Trademark, 08.23.2016, Motienko, A.I., Bukharin, V.V., “The Survey of Expert on Injury (computer program)”.

Recent Results

1. A model of effectiveness of the rescue process affected people by accidents at hazardous production facilities, provides the ability to calculate the number of detected and saved affected people at any given time [2, 6].
2. The models of decision support on the way of salvation-affected people, allowing reveal the category of injury, depending on the degree of severity of the injury and the transport position, based on Bayesian trust networks [21].
3. A method for planning a trajectory of motion of robotic tools transport affected, allowing to minimize the transportation to evacuate the affected area [13].
4. A structural-functional model of modernization of telecommunication systems and decision-making model for choosing optimal for a given criterion of completions for each version of the system [12].
5. The solution of problems of information support of the functioning of complex technical systems (CTS) based on attraction of additional information resources at various stages of operation [11].
6. The decision of the information and computing tasks in the framework of the model of researches of organizational and economic systems, providing the minimum value of the total error for a given duration of follow-up [10].

References

Monographies

1. Matyash, V.A., Ivanov, A.V., Karlovskiy, M.Y. Development and Implementation of New Cosmic Technologies under Scientific Development and Joint Training on Information and Aerospace Fields of Studying (monograph). St. Petersburg: SUAI. 2015. 108 p.

Papers Published in Editions Indexed by WoS, Scopus

2. Motienko, A.I., Ronzhin, A.L., Basov, O.O., Zelezny, M. Modeling of Injured Position during Transportation Based on Bayesian Belief Networks // Proceedings of the First International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’16). Springer International Publishing. 2016. pp. 81–88. (Scopus SJR = 0,339).
3. Ronzhin, A.L., Basov, O.O., Motienko, A.I., Karpov, A.A., Mikhailov, Y.V., Zelezny, M. Multimodal Information Coding System for Wearable Devices of Advanced Uniform // 18th International Conference on Human-Computer Interaction (HCI International 2016). 2016. LNCS 9734. pp. 539–545. (Scopus SJR = 0,339).
4. Saitov, I.A., Basov, O.O., Motienko, A.I., Saitov, S.I., Bizin, M.M., Budkov, V.Yu. Neural Network System for Monitoring State of a

High-Speed Fiber-Optical Linear Path // Advances in Neural Networks – ISNN 2016. Springer International Publishing Switzerland. 2016. LNCS 9719. pp. 497–504. (Scopus SJR = 0,339).
5. Motienko, A., Dorozhko, I., Tarasov, A., Basov, O. Proactive Robotic Systems for Effective Rescuing Sufferers // Interactive Collaborative Robotics: First International Conference (ICR 2016). 2016. LNCS 9812. pp. 172–180. (Scopus SJR = 0,339).

Papers Published in Russian Editions Indexed by RSCI

6. Motienko, A.I., Tarasov, A.G., Dorozhko, I.V. Basov, O.O. Proactive control of robotics rescue systems // SPIIRAS Proceedings. Vol. 3(46). 2016. pp. 169–189. (VAK; RSCI impact factor – 0,359).
7. Burakov, V.V., Volkov, V.F., Potryasayev, S.A., Salukhov, V.I., Shedko, N.A. Formalized Approaches to the Study of the Accuracy of the Economic Systems Models // SPIIRAS Proceedings. Vol. 4(47). 2016. pp. 192–210. (VAK; RSCI impact factor – 0,359).
8. Volkov, V.F., Kovalyov, A.P., Potryasayev, S.A, Salukhov, V.I. The Algorithm of operating management in the deployment of information management systems of complex technical systems // Proceedings SPIIRAS. Vol. 1(44). 2016. pp. 83–97. (VAK; RSCI impact factor – 0,359).
9. Salukhov, V.I., Soldatenko, V.S., Motiyenko, A.I. Structural-functional Model and methodology of the Problem Solving of Justification of Upgrading Telecommunications Systems // Information and Communication. No. 1. 2016. pp. 5–10. (VAK; RSCI impact factor – 0,395).
10. Motiyenko, A.I. Planning of Tactical Trajectory of the Motion of Automated Robotic Facilities at Rectification of the Consequences of the Emergencies // Scientific Bulletin BSU. 2016. pp. 139–143. (VAK; RSCI impact factor – 0,261).
11. Ivan'ko, D.V., Kipyatkova, I.S., Ronzhin, A.L., Karpov, A.A. Analysis of Multimodal Integration of Information Methods for Audio-visual Speech Recognition // Scientific and Technical Gazette of Information Technologies, Mechanics and Optics. No. 3, 2016. pp. 387–401. (VAK; RSCI impact factor – 0,285).
12. Mironov, A.N., Kazakov, R.R., Basotin, E.V., Kazakov, R.R., Shestopalova, O.L. Analysis of Problem solving in Management of the Life-cycle of Ground Equipment Rocket and Space Complexes // Basic Research. No. 6-2. 2016. pp. 282–287. (VAK; RSCI impact factor – 0,512).
13. Zakharov, V.V., Potryasayev, S.A., Salukhov, V.I., Shkodyrev, V.P. Information Technology of Positioning Mobile Robot Techniques RFID // Materials of the conference "Management in the Sea and

Aerospace Systems” (UMAS, 2016). – SPb: “Concern “CNII “Electropribor””, 2016.. pp. 104–111.
14. Zelentsov, V.A., Salukhov, V.I. Problems of Training Specialists in the Field of Remote Sensing of the Earth: Materials of II Interregional Scientific and Practical Conference. Sevastopol, 2016. pp. 22–26.
15. Motiyenko, A.I., Basov, O.O., Ronzhin, A.L. Automated Robotic Means of Transportation of the Wounded // Proceedings of the military-scientific conference «Robotization of the Russian Federation Armed Forces». Moscow. 2016. pp. 242–248.
16. Motiyenko, A.I., Dorozhko, I.V., Tarasov, A.G., Basov, O.O. Representation of Knowledge in rescue robotics systems based on Bayesian belief networks // Proceedings of the All-Russian scientific-practical conference “Problems of creation and use of small spacecraft and robotic vehicles for the purposes of the Armed Forces of the Russian Federation”. SPb. 2016. pp. 469–474.
17. Motiyenko, A.I., Basov, O.O., Ronzhin, A.L. The distribution of tasks between the elements affected robotic rescue system // XXIX - International Conference Mathematical Methods in Engineering and Technology (MMTT- 29). 2016. Vol.9. pp. 134–138.
18. Basov, O.O., Motiyenko, A.I. Models and methods of decision-making support on the way of salvation affected using robotic tools // XVI Conference on Space Biology and Medicine with international participation. 2016. pp. 18–205.
19. Kasatkin, V.V. Yakovlev, S.A. Simulation of complex objects management systems: epistemological and information models // Proceedings of the All-Russian scientific-practical conference “Information systems and technologies in modeling and management”. – Simferopol: IT “Arial”, 2016.
20. Plebanek, O.V. “Soviet Culture”‘ as a concept and as a ideologem // Soviet culture in the context of global history: the mat. VI Intern. Scientific Conf. St. Petersburg, November 18-19, 2016 / Balt. State. Tehn. Univ. - St. Petersburg, 2016. pp. 55–58.
21. Kasatkin, V.V., Yakovlev, S.A. Modern information systems modeling technology // Perspective Directions of Development of The Domestic Information Technology: Materials II Interregional Scientific and Practical Conf. Sevastopol, September 13-17, 2016 / Sevastopol National Technical University; scientific. Ed. B.V. Sokolov - Sevastopol: SevSU, 2016. pp. 20–22.
22. Kasatkin, V.V., Yakovlev, S.A. Simulation: the technology and means of formation of professional competence of the technical profile of IT-specialist // Modern Education: Content, Technology,

Quality: XXII Int. Scientific-Method. Conf.: Publishing House of ETU «LETI». SPb. April, 2016. Vol.2. 2016. pp. 104–107.
23. Ipatov, O.S., Kasatkin, V.V., Kolbanev, M.O., Information platform of economic activity // Perspective Directions of Development of The Domestic Information Technology: Materials II Interregional Scientific and Practical Conf. Sevastopol, September 13-17, 2016 / Sevastopol National Technical University; scientific. Ed. B.V. Sokolov - Sevastopol: SevSU, 2016. pp. 37–39.
24. Kolbanyov, M.O., Kasatkin, V.V., Poymanova, E.D. Energy aspects of ensuring the integrity of data in storage systems. Information Security Technology. Digest of articles. St. Petersburg: Publishing House of the ETU. 2016. pp. 70–78.

Other Publications

25. Kasatkin, V.V., Kolbanyov, M.O., Tatarnikova, T.M. Model communication and examples of its application. // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 35–39.
26. Kasatkin, V.V., Yakovlev, S.A. Simulation modeling of information-control systems // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 45–46.
27. Kasatkin, V.V., Sovetov, B.Ya. Integration of education, science and industry as the basis of a professional orientation of IT professionals with a multi-level training // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 359.
28. Verzun, N.A., Kasatkin, V.V., Kolbanyov, M.O. Industrial internet and cybernetic physical biological production systems // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 251.
29. Kasatkin, V.V., Sovetov, B.Y., Yakovlev, S.A. Actualization of approximate basis of educational training programs for developers of information systems and technologies based on the coupling of the GEF with professional standards // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 360–361.
30. Kasatkin, V.V., Yakovlev, S.A. Simulation modeling of specialists training in the information technology field // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 361–362.

31. Sovetov, B.Ya., Kasatkin, V.V. Fundamental and professional orientation training in information technology personnel // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 384–385.
32. Sovetov, B.Ya., Kasatkin, V.V. The role of the graduate school as the third stage of higher education of IT professionals // Proceedings of the XV Jubilee St. Petersburg International Conference “Regional Informatics (RI-2016)”. St. Petersburg. 2016. pp. 385–386.
33. Sovetov, B.Ya., Kasatkin, V.V. New trends in training in information technology personnel. II Interregional Scientific and Practical Conf. Sevastopol. SevSU, 2016.
34. Kasatkin, V.V., Kolbanev, M.O., Poymanova, E.D. Analysis of the processes of long-term data storage // Proceedings of the II interregional scientific and practice conference of perspective directions of domestic information technologies development. SevSU, 2016. pp. 42–45.

Abbreviations

BSTU	Baltic State Technical University
DNTIT RAS	Departament of Nano Technologies and Information Technologies
FAR	Foundation 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 Podnosova I.P.
Computer composition Miroshnikova E.P., Belova R.I.

CONTENTS