

## Publication List of Dr. Nikolay V. Shilov

### Personal Data

- Date of Birth: April 24, 1961
- Sex: Male
- Family status: married, 4 sons and 2 daughters
- Citizenship: Russia

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Homepages:

- <https://university.innopolis.ru/en/about/teaching-composition/nikolay-shilov/> (official)
- <http://persons.iis.nsk.su/en/person/shilov> (personal, always a little bit out of date)

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Institution presently associated with:

Assistant Professor at Innopolis University (see above for mailing address).

### SUMMARY

My research interests are around *Theory, Logic, and Formal Methods* in Computer Science, Programming Languages, Software Engineering, and Information Technology. I am experienced in theory of *program logics* and *algorithms* for reasoning about program systems. I have a sound knowledge of *Program Semantics and Verification, Formal Description Techniques* (FDT) for distributed systems. I also have research experience with design, implementation and use of model checking algorithms in formal verification of FDT-specifications. Recently my research interests expanded to theory of knowledge representation, processing, and reasoning, multiagent systems and distributed algorithms, computer languages ontology and methodology.

I have more than 20 years of experience in *Applied Logic*: dynamic logic, temporal logic, logic of knowledge, description logic, etc. I am especially interested in algorithmic problems (i.e. model checking, decidability, and axiomatization) for propositional versions of these logics. The main application areas of my theoretical research are *formal program semantics and verification, formal methods, formal ontologies* (for example – for classification of Computer Languages), *knowledge representation and reasoning formalisms* (like Formal Concept Analysis, Description and Epistemic Logics), *distributed and multiagent systems*.

I have more than 23 years of teaching experience (including 7 years overseas) in Computer Science (in particular in Algorithms, Program Languages and Theory), in Discrete Mathematics (especially in Mathematical Logic) at different levels (college, undergraduate, graduate, and



postgraduate). I am very much interested in different programming contests and Olympiads for students. In particular I am involved into organization of regional competitions of this kind. I also have supervisor/adviser experience at undergraduate, graduate, and postgraduate levels. I like very much popularization of Computer Science and Mathematical Logic among high school pupils and undergraduate students.

I have teaching experience with higher education systems in Australia, New Zealand, South Korea, Kazakhstan (a blend of British/American systems) and Russia (very traditional European-styled system).

I have published more than 100 articles, papers and reports. Since 1997 I have published

- 10 papers in journals indexing by Web of Science and/or Scopus (in particular, in Communications of ACM),
- more than 40 in proceedings of peer review International conferences and workshops (including more than 10 papers in Lecture Notes in Computer Science).

Total number of articles and papers published since 1997 in media indexed by Web of Science and/or Scopus is 26.

A number of times I participated in International Program Committees, organized several national and international workshops, have delivered invited talks at international level.

#### Education and Qualification:

- 1978 – Graduated Novosibirsk Physics & Mathematics School (<http://sesc.nsu.ru/main/index.php>)
- 1983 - Graduated Mathematics and Mechanics Department of Novosibirsk State University (NSU). Qualification upon graduation: Master in Mathematics, Applied Mathematics, and Programming. Specialized in applied logic and computer science. Ms. Thesis' title: Non-deterministic Program Schemata and their utility for logics of programs.
- 1987 - Ph.D. in Computer Science, Institute of Computational Mathematics and Mathematical Geophysics of Siberian Branch of the Russian Academy of Sciences (former Novosibirsk Computing Center of Soviet Academy of Science). Ph.D. Thesis' title: Program Logics and their Applications.

#### Employment history:

- Since 01.10.2016 – Assistant Professor at Institute of Information Systems (Laboratory for Cyber-Physical Systems), Innopolis University
- From 05.08.2013 to 04.08.2015: Visiting Associate Professor of Computer Science Department, School of Science and Technology, Nazarbayev University
- 01.09.2012-30.10.2013: visiting Professor, Samsung Electronics Global Faculty program, Samsung Advanced Technology Training Institute
- From 1987 to 30.09.2016: Research positions at Institute of Informatics Systems of Russian Academy of Science (IIS), Laboratory of Theoretical Programming
- 1992-01.09.2012: Teaching at Novosibirsk State University (NSU), Mathematics and Mechanics Department, Mathematics and Mechanics Department, School of Programming
- 2006-01.09.2013: Teaching at Novosibirsk State Technical University, Department of Applied Mathematics, School of High Performance Computing
- in 2007 – Visiting Distinguished Professor at School of Computer Science and Engineering,

Chung-Ang University, Seoul, Korea

- in 2005 – Visiting Professor at Computer Science Department, Korea Advanced Institute of Science and Technology (KAIST)
- in 2003 – Visiting Associate Professor (Erskine Fellowship) at Department of Computer Science, University of Canterbury, New Zealand
- in 2000-2001 - Research Professor at Computer Science Department, Korean Advanced Institute of Science and Technology (KAIST)
- in 1998-1999 - Visiting Lecturer at School of Computing Science (now Department of Software Engineering), Faculty of Mathematical and Computing Science of University of Technology, Sydney

#### Area of expertise:

- Computer Science Logic (i.e. dynamic, temporal, epistemic, and description logic), algorithmic problems for Computer Science Logic (model checking, decidability, complexity, axiomatization, etc),
- Applications of Computer Science Logic to program specification and verification (Formal Methods), semantics of program languages, distributed and multiagent systems, knowledge representation and reasoning, Semantic Web, Computer Aided Software Engineering (CASE) and Formal Description Techniques (FDT).

#### Programming skills and related experience:

- Programming Languages: Pascal, C/C++, Refal, Lisp, ML, Caml at educational level.
- Specification Languages: SDL, Estelle, Promela at educational and research level.
- Knowledge representation languages: RDF and Owl at educational level.
- Verification tools: SMV, SPIN and ACL2 at educational level.
- Operating Systems: Widows and Unix-like environment at user level.

#### Publications

More than 100 articles, papers, and reports ( $\geq 50$  papers in English). List of the most significant papers follows (classified by type of publication).

##### 1. Dissertation(s) and Book(s)

- 1.1. *Program Logics and their Applications*. Ph.D. Thesis. Novosibirsk Computing Center of Siberian Branch of the Soviet Academy of Science, 1987, 140 p. (In Russian.)
- 1.2. *Introduction to Program Syntax, Semantics, Specification and Verification*. Novosibirsk State University, 2012, 298 p. (In Russian)

##### 2. Journals indexing by Web of Science and/or Scopus (since 1997)

- 2.1. *Program schemata vs. automata for decidability of program logics*. Theoretical Computer Science, v. 175, 1997, p.15-27.
- 2.2. *Specification and verification of distributed systems by means of Elementary-REAL*. Programming and Computer Software, v.25, n.4, 1999, p.222-232 (with Nepomniaschy V.A. and Bodin E.V.)
- 2.3. *Engaging Students with Theory through ACM Collegiate Programming Contests*. Communications of ACM, v.45, n.9, 2002 (with Yi K.)
- 2.4. *Update and Abstraction in Model Checking of Knowledge and Branching Time*.

- Fundamenta Informaticae*, v.72, n.1-3, 2006, p.347-361 (with Garanina N. O. and Choe K.-M.)
- 2.5. *Generation of verification conditions for imperative programs*. Programming and Computer Software, v.34, n.6, 2008, p.307–321. (with Anureev I.S. and Bodin E.V.)
  - 2.6. *F@BOOL@: Experiment with a simple verifying compiler based on SAT-solvers*. Automatic Control and Computer Sciences, v.45, n.7, 2011, p.428-436.
  - 2.7. *Verification of Backtracking and Branch and Bound Design Templates*. Automatic Control and Computer Sciences, v.46, n.7, 2012, p.402–409.
  - 2.8. *Some Results on Multiagent Algorithms in Social Computing/Software Context*. Information, v.17, n.1, 2014, p.229-240 (with Satykbayeva A.)
  - 2.9. *Program Schemata Technique for Propositional Program Logics: A 30-Year History*. Programming and Computer Software, v.42, n.4, 2016, p. 239–256. (with S.O. Shilova and A.Yu. Bernstein)
3. Peer review National journals (since graduation at 1983)
- 3.1. *Dynamic Logic of Processes*. Programmirovaniye (in Russian), v.12, 1986 (translation of this Soviet journal before 1991 was distributed by Plenum Press as Programming and Computer Software)
  - 3.2. *Non-deterministic Program Schemata and their relation to Dynamic logic*. Kibernetika (in Russian), v. 24, 1988 (with Nepomniaschy V.A., translation of this Soviet journal before 1991 was distributed by Plenum Press as Cybernetics and Systems Analysis)
  - 3.3. *REAL92: a Combined Specification Language for real-time concurrent systems and properties*. Programmirovaniye (in Russian), v.19, 1993 (with Nepomniaschy V.A.)
  - 3.4. *Etude on Theme of Dijkstra: Computer Scientists at home of Geometers*. Potential (in Russian), n.9, 2006 (with Gorodnya L.V., Bodin E.V. and Andreeva T.V.)
  - 3.5. *Peanuts of Travelling Mathematician*. Kvant (in Russian), n.5, 2007.
  - 3.6. *Solving contest problems via formal program verification*. Problems of Programming, ISSN 1727 – 4907, n.2-3, 2010, p.355-362 (with Shilova S.O.)
  - 3.7. *A note on Programming Paradigms*. Potential (in Russian) ISSN 1814 – 6422, n.4, 2010, p. 33-38.
  - 3.8. *Guided tour inside F@BOOL@: a case-study for a SAT-based verifying compiler*. Modeling and Analysis of Information Systems (in Russian) ISSN 1818 – 1015, v.17, n.4, 2010, p. 111-124.
  - 3.9. *What is Parallel Programming?* Potential (in Russian) ISSN 1814 – 6422, n.3, 2011, p. 51-54 (with S. Shilova).
  - 3.10. *Mars Robot Puzzle: Multiagent approach to a Dijkstra problem*. Modeling and Analysis of Information Systems (in Russian) ISSN 1818 – 1015, v.18, n.2, 2011, p. 120-129 (with Garanina N.O. and Bodin E.V.)
  - 3.11. *Verification of Algorithm Templates: Backtracking and Branch & Bound*. Modeling and Analysis of Information Systems (in Russian) ISSN 1818 – 1015, v.18, n.4, 2011, p. 168-180.
  - 3.12. *Three faces of dynamic programming*. Novosibirsk State University Journal of Information Technologies (in Russian) ISSN 2410-0420 (Online), ISSN 1818-7900 (Print) v.10, n.2, 2012, p, 76-84.
  - 3.13. *“Robots in Space” multiagent problem: complexity, information and*

- cryptographic aspects. Modeling and Analysis of Information Systems* (in Russian) ISSN 1818 – 1015. v.20, n.2, 2013, p. 34–53 (with Bernstein A. Yu.)
- 3.14. *Teaching Formal Models of Concurrency Specification and Analysis. Modeling and Analysis of Information Systems* ISSN 1818 – 1015. v.22, n.6, p.783-794.
- 3.15. *On specification and verification of standard mathematical functions. Humanities and Science University Journal*, ISSN 2222 – 5064, 2016, n.19, p.57-68 (with Promsky A.V.).
4. Peer review book chapters (since 2000)
- 4.1. *REAL: combined language for specification and verification of real-time systems* (in Russian). In: *Systemnaya Informatika (System Informatics)*, v.7, Nauka (Science) Publishers, Novosibirsk, 2000 (with Nepomniaschy V.A. and Bodin E.V.)
- 4.2. *Program Logics Made Easy* (in Russian). In *Systemnaya Informatika (- System Informatics)*, v.8, Nauka (Science) Publishers, Novosibirsk , 2002 (with K. Yi and E.V. Bodin)
- 4.3. *How to find a coin: propositional program logics made easy*. In *Current Trends in Theoretical Computer Science*, World Scientific, v. 2, 2004 (with Yi K.)
- 4.4. *Model Checking of Combined Logics of Knowledge, Action and Time* (in Russian). In: *Systemnaya Informatika (- System Informatics)*, v.10, Nauka (Science) Publishers, Novosibirsk, 2006 (with N.O. Garanina).
- 4.5. *Modal Logics for reasoning about Multiagent Systems*. In: *Encyclopedia of Artificial Intelligence*. J.R. Rabucal, J. Dorado, A.P. Sierra, editors. Information Science Reference. 2008, p.1089-1094 (with N.O. Garanina).
- 4.6. *Formal techniques for ontology* (in Russian). In: *Logical and Linguistic Formal Models and Techniques for Information Systems. Systemnaya Informatika (System Informatics)*, v.11, Publisher of Russian Academy of Science (Siberian Div.), Novosibirsk, 2009, p.10-48.
- 4.7. *An approach to design of automata-based axiomatization for propositional program and temporal logics (by example of linear temporal logic)*. In: *Logic, Computation, Hierarchies. Series:Ontos Mathematical Logic*, v.4 Ontos-Verlag/De Gruyter, Germany, 2014, p.297-324.
5. Proceedings of peer review International Conferences and Workshops (since 2000)
- 5.1. *On Expressive and Model Checking Power of Propositional Program Logics*. Proc. of int. Conf. Perspectives of System Informatics PSI'01, Russia, 2001, Springer LNCS, v.2244, 2001 (with Yi K.)
- 5.2. *Basic-REAL: integrated approach for design, specification and verification of distributed systems*. Proc. of int. Conf. Integrated formal Methods IFM'02, Finland, 2002, Springer LNCS, v.2335, 2002 (with Nepomniaschy V.A. Bodin E.V. and Kazura V.E.)
- 5.3. *Polynomial Approximations for Model Checking*. Proc. of int. Conf. Perspectives of System Informatics PSI'03, Russia, 2003, Springer LNCS, v.2890, 2004 (with Garanina N.)
- 5.4. *Model Checking Mu-Calculus in Well-Structured Transition Systems*. Proc. of International Symposium Temporal Representation And Reasoning TIME'04, France, 2004, IEEE Press, 2004 (with Kouzmin E.V. and Sokolov V.A.)
- 5.5. *Proofs about folklore: why model checking = reachability?* MATHEMATICAL LOGIC

- IN ASIA, Proceedings of the 9th Asian Logic Conference. World Scientific Publishing Co., 2006, p.41-50 (with K.-M. Choe, H. Eo, S.-H. O, and K. Yi).
- 5.6. *Well-structured Model Checking of Multiagent Systems*. Proceedings of 6th International Conference Perspectives of System Informatics, Springer Lecture Notes in Computer Science, v. 4378, 2006, p.351-365 (with N.O. Garanina).
  - 5.7. *On Mathematical Contents of Computer Science Contests*. Enhancing University Mathematics: Proceedings of the First KAIST International Symposium on Teaching. CBMS Issues in Mathematics Education v.14. American Society, 2007. p. 193-204 (with S.O Shilova).
  - 5.8. *Model Checking Problem for Acting Agents with log-files*. A Meeting of the Mind: Proceedings of the Workshop on Logic, Rationality and Interaction, Beijing, 2007. Oxford Texts in Computer Science V.8. P. 257-262. (with Garanina N.O.)
  - 5.9. *A proposal of Description Logic on Concept Lattices* Proceedings of the Fifth International Conference on Concept Lattices and their Applications, 2007. CEUR Workshop Proceedings, v.331, 2008, p.165-176. (with S.-Y. Han).
  - 5.10. *A note on three Programming Paradigms*. Proceedings of Second International Valentin Turchin Memorial Workshop on Metacomputation in Russia. Ailamazyan Program Systems Institute, 2010, p. 173 – 184.
  - 5.11. *Algorithm Design Template base on Temporal ADT*. Proceedings of 18th International Symposium on Temporal Representation and Reasoning (12 - 14 September, 2011, Lübeck, Germany). IEEE Computer Society, 2011, p.157-162
  - 5.12. *Combined Logics of Knowledge, Time, and Actions for Reasoning about Multi-agent Systems*. Knowledge Processing and Data Analysis. Lecture Notes in Computer Science, v.6581, 2011, p.48-58. (with Garanina N.O.)
  - 5.13. *Development of the Computer Language Classification Portal*. Post-proceedings of Ershov Informatics Conference. PSI Series. Lecture Notes in Computer Science, v.7162, 2012, p. 340-348 (Akinin A.A., Zubkov A.V., Idrisov R.I.)
  - 5.14. *Inverting Dynamic Programming*. Proceedings of Third International Valentin Turchin Memorial Workshop on Metacomputation in Russia. Ailamazyan Program Systems Institute, 2012, p. 216 – 227.
  - 5.15. *Agent Knowledge and Beliefs in a Cloud*. Post-proceedings of Kazakh-British workshop Embracing Global Computing in Emerging Economies (26-28 February 2015, Almaty, Kazakhstan). Springer series Communications in Computer and Information Science, vol. 514, 2015, p.11-20.
  - 5.16. *Program Scheme Technique to Solve Propositional Program Logics Revised*. Post-proceedings of 10th Ershov Informatics Conference (PSI-2015, 25-27 August 2015, Innopolis, Kazan, Russia). Springer Lecture Notes in Computer Science, 2016, v.9609, p.245-259.
6. Other selected publications (since 2006)
    - 6.1. *SAT vs. SMV for automatic validation of tabular property of superintuitionistic logics*. Bulletin of Novosibirsk Computing Center, Special issue of A.P. Ershov Institute of Informatics Systems, Computer Science Series, v.25, 2006 (with Schreiner P.A. , Grebeneva J.V. and O S.).
    - 6.2. *Combining Two Formalism for Reasoning about Concepts*. Proceedings of the 2007 International Workshop on Description Logics. CEUR Workshop Proceedings, v.250, 2007, p.459-466. (with Anureev I.S. and Garanina N.O.)

- 6.3. *Realization Problem for Formal Concept Analysis*. Proceedings of the 21st International Workshop on Description Logics (DL2008). CEUR Workshop Proceedings, v.353, 2008.
- 6.4. *On the problem of computer language classification*. Bulletin of the Novosibirsk Computing Center. Series: Computer Science, v.28, 2008. (with Anureev I.S., Bodin E.V., Gorodnaya L.V., Marchuk A.G., Murzin F.A.)
- 6.5. *Can Robots Solve the Assignment Problem?* Proceedings of the 2009 Workshop on Concurrency, Specification, and Programming. Kraków-Przegorzały, Poland, 28-30 September 2009, v.1, 2009, p.154-163 (with Garanina N.O., and Konyaev L.E.).
- 6.6. *Multiagent approach to a Dijkstra problem*. Proceedings of the 2010 Workshop on Concurrency, Specification, and Programming CS&P 2010, Humboldt-Universität zu Berlin, 2010, p.73-84. (with Garanina N.O. and Bodin E.V.)
- 6.7. *Rational Agents at the Marketplace*. In Proceedings of Workshop on Concurrency, Specification and Programming CS&P'2011 (Pułtusk, Poland, September 28-30, 2011). Białystok University of Technology, p.465-476. (with Garanina N.O.)
- 6.8. *Make Formal Semantics Popular and Useful*. Bulletin of the Novosibirsk Computing Center (Series: Computer Science, IIS Special Issue), ISSN 1680 – 6972, v.32, 2011, p.107-126.
- 6.9. *New Developments of the Computer Language Classification Knowledge Portal*. Proceedings of the 6<sup>th</sup> Spring/Summer Young Researchers' Colloquium on Software Engineering (SYRCoSE 2012), May 30-31, 2012 – Perm, Russia, p.54-58. (with A. Akinin and A. Zubkov.)
- 6.10. *Unifying Dynamic Programming Design Patterns*. Bulletin of the Novosibirsk Computing Center (Series: Computer Science, IIS Special Issue), ISSN 1680 – 6972, v.34, 2012, p.135-156.
- 6.11. *Towards Description Logic on Concept Lattices*. Proceedings of International conference on concept lattices and their applications (CLA-2013, La Rochelle, France, October 15-18, 2013) CEUR Workshop Proceedings, v. 1062 p.287-292 (with J.V. Grebeneva and N.O. Garanina).
- 6.12. *Alias Calculus for a Simple Imperative Language with Decidable Pointer Arithmetic*. In Tools and Methods of Program Analysis. Proceedings of International Science and Practical Conference. Kostroma (TMPA-2014, 14-15 November, 2014). Kostroma State Technological University, 2014, p.29-35. (with A.P. Vorontsov A.P. and A. Satykbayeva)
- 6.13. *A Need To Specify and Verify Standard Functions*. Has been presented at Tools and Methods of Program Analysis, an International Science and Practical Conference. TMPA-2015, 12-14 November, 2015, Saint Petersburg, Russia). Proceedings to be published by Saint-Petersburg State Polytechnic University, 2015, p.119-122.
- 6.14. *On the need to specify and verify standard functions*. Bulletin of the Novosibirsk Computing Center (Series: Computer Science, IIS Special Issue), ISSN 1680 – 6972, v.38, 2015, p.107-121.
- 6.15. *ALC for CLA: Towards Description Logic on Concept Lattice*. In Proceedings of Russian Conference with international participation Knowledge – Ontology – Theories (KONT-2015, October 6-8, 2015, Novosibirsk, Russia) S.L. Sobolev Institute of Mathematics, 2015, v.2, p.216-221.
- 6.16. *Algorithm Design Patterns: Program Theory Perspective*. In Proceedings of Fifth International Valentin Turchin Workshop on Metacomputation (META-2016, June 27 –

July 1, 2016, Pereslavl-Zalessky, Russia), University of Pereslavl, p. 170-181.

- 6.17. *Towards platform-independent verification of the standard mathematical functions: the square root function.* arXiv:1801.00969 [cs.LO] (with Anureev I.S., Berdyshev M., Kondratev D., Promsky A.V.)

## Teaching and Related Experience

- since 1990: supervisor of 20 undergraduate, 8 graduate, and 3 Ph.D. students at Novosibirsk State University (Russia), A.P. Ershov Institute of Informatics Systems (Novosibirsk, Russia) and L.N. Gumilyov Eurasian National University (Astana, Kazakhstan);
- 1992-1998: teaching (instructor) Fundamentals of Programming & Data Structures, Discrete Mathematics at Mathematics and Mechanics Department of Novosibirsk State University;
- 1994-1998: elective course on Advanced Topics on Mathematical Logic for graduate students of Chair of Programming at Mathematics and Mechanics Department of Novosibirsk State University;
- 1999-2000, 2001-2002, 2003-2004, and 2007-2009: teaching Basics of Algorithm Design and Implementation for 1-2 year students (15-17 years old) at College of Informatics of Novosibirsk State University;
- 1995-1998, 1999, 2001, and 2003: (co-)coach of student teams of Novosibirsk State University for programming contests (including ACM International Collegiate Programming Contests);
- 1990-2015: co-Chair of a senior students & research seminar Theoretical and Experimental Programming at Institute of Informatics Systems and Novosibirsk State University (together with Prof. Nepomniaschy V.A.);
- 2003-2004 and 2006-2011: undergraduate course on Programming Languages Processing (Compilation Techniques, Program Analysis and Verification) at Information Technology Department of Novosibirsk State University;
- 2005: special course on Logic Formal Program Verification for graduate students of Program Languages Laboratory, Computer Department of Korea Advanced Institute of Science and Technology;
- since 2004: Jury member of Open All-Siberian Programming Contests;
- 2005-2011: graduate course on Design and Analysis of Algorithms at Information Technology Department of Novosibirsk State University;
- 2006-2012: special courses on Functional Programming and Topics on Concurrency for graduate students at Chair of Parallel Computing Technologies of Novosibirsk State Technical University;
- 2007-2012: undergraduate courses Fundamentals of Programming and Data Structures at Mechanics and Mathematical Department of Novosibirsk State University;
- 2008-2012: special course on Formal Models for Concurrency for graduate students at Chair of Parallel Computing Technologies of Novosibirsk State Technical University;
- 2013-2015: undergraduate courses on Web Programming & Problem Solving, Fundamental of Programming, Performance & Data Structures at Computer Science Department of Nazarbayev University;
- 2013-2015: undergraduate elective course on Theory (and Analysis) of Algorithms at Computer Science Department of Nazarbayev University;



- 2015: undergraduate elective course on Parallelism and CUDA at Computer Science Department of Nazarbayev University;
- 2015: graduate elective topic on Formal Methods in Software Engineering for graduate students at Mathematics and Mechanic Department of Novosibirsk State University;
- 2016: post-graduate elective topic on Advance Automata Theory at Institute of Informatics Systems;
- 2017: undergraduate course on Probability Theory & Statistics at Innopolis University;
- 2017: graduate course on Discrete Mathematics & Logic at Innopolis University;
- 2017: undergraduate elective course on Mathematical Foundations of Digital Signal processing at Innopolis University;
- 2017-2018: undergraduate course on Discrete Mathematics & Logic at Innopolis University;
- 2018: undergraduate courses on Calculus-II and Differential Equations at Innopolis University.

### Invited Contributions

1. Master class on “Fun and Art of Formal Methods” at Russian National Conference on Programming Languages and Compilers (PLC-2017, Rostov-on-Don, April 3-5, 2017)
2. Invited talk *Agent Knowledge and Belief in Distributed Systems* at SYRCoSE-2015 (Spring/Summer Young Researchers' Colloquium on Software Engineering) (May 28-30, 2015, Samara, Russia)
3. Invited talk *Agent Knowledge and Beliefs in a Cloud* at Kazakh-British Workshop Embracing Global Computing in emerging economies (26-28 February 2015, Almaty)
4. Invited mini-course *Make Formal Program Semantics Easy* at Computer Science Club (March 09-12, 2012, Ekaterinburg, Russia)
5. Invited tutorial *Multiagent Systems in Social Software* at autumn school CSEDays: Application 2011 (November 24-27, 2011, Ekaterinburg, Russia)
6. Invited tutorial *What Programmers should know about Program Logics* at autumn school CSEDays: Application 2010 (November 12-14, 2010, Ekaterinburg, Russia)
7. Invited talk *Formal Models and Tools for Ontology Development and Processing* at Russian National Symposium on Ontology Modeling (May 20-21, 2008, Zvenigorod near Moscow, Russia)
8. Invited talk *Combining Logics of Knowledge, Time and Actions for Reasoning about Intelligent Agents* at 3-rd International Conference on Next Generation Web Services Practices NWeSP'07 (October 29-31, 2007, Seoul, Korea)
9. Invited talk *Program Logics: theory and applications* at the International Conference on Industrial Survival Strategy for Next Generation Information Technology, organized by Korea Information Processing Society (June 21-22, 2001, Seoul, Korea)

### Service to Academia

#### Current activities:

1. Since 2012: Member of the Program Committee SYRCoSE (Spring/Summer Young Researchers' Colloquium on Software Engineering).
2. Since 2009: Member of the Program Committee of International workshops on Program Semantics, Specification & Verification: Theory and Application (please refer web-pages

PSSV-2010/2016); in 2016: Organizing Chair; since 2017 – Program Committee co-Chair (PSSV-2017, PSSV-2018).

3. Since 2008 – member of the Editorial Board of Computer Science and Telecommunications electronic journal, published by Georgian Technical University and St. Andrew the First Called Georgian University of The Patriarchy of Georgia.
4. Since 2016 – member of the Program Committee of Track on Service-Oriented Architectures and Programming of ACM/SIGAPP Symposium on Applied Computing (SAC).

Past:

5. Member of the Program Committee of Russian National Conference on Programming Languages and Compilers (PLC-2017, Rostov-on-Don, April 3-5, 2017).
6. Member of the Program Committee of IJCAI-2016 – 25th International Joint Conference on Artificial Intelligence (New York City, 9th-15th July, 2016).
7. Workshop co-chair of PSI 2015 – 10th International Andrey Ershov Memorial Conference (25 - 27 August 2015, Innopolis/Kazan, Russia)
8. Member of the Program Committee of 3<sup>rd</sup> International Workshop Algebra across the borders (8-13 September, Astana/Almaty, Kazakhstan).
9. 2011-2014: Director of A.P. memorial non-profit regional foundation for Advance of Computer Science and Art of Programming.
10. Member of the Program Committee of Embracing Global Computing in emerging economies (26-28 February 2015, Almaty) funded by the British Council and the Kazakh Ministry of Education and Sciences under the Newton–al-Farabi Partnership Program to support joint research between Kazakhstan and United Kingdom.
11. Organizer and Program Chair of the 2<sup>nd</sup> International Workshop Fun With Formal Methods (July 13, 2014) affiliated with the 26th International Conference on Computer Aided Verification (July 18-22, 2014, Vienna, Austria)
12. Organizer and Program Chair of the International Workshop Fun With Formal Methods (July 13, 2013) affiliated with the 25th International Conference on Computer Aided Verification (July 13-19, 2013, Saint Petersburg, Russia)
13. Member of the Program Committee of Eight Andrei Ershov International Conference Perspectives of System Informatics (June 27- July 01, 2011, Novosibirsk, Russia)
14. Member of the Program Committee of Fourth International Workshop on Program Understanding affiliated with Eight Andrei Ershov International Conference Perspectives of System Informatics (June 27- July 01, 2011, Novosibirsk, Russia)
15. Organizer and Chair of the third workshop Knowledge and Ontology \*ELSEWHERE\*, affiliated with Eight Andrei Ershov International Conference Perspectives of System Informatics (June 27- July 01, 2011, Novosibirsk, Russia)
16. Organizer of Russian workshop Art of Programming affiliated with Eleven Open All-Siberian Programming Contest (November 05, 2010, Novosibirsk, Russia)
17. Organizer of Seminar Functional and Stream Programming Seminar affiliated with International Workshop on Stream processing and Programming (September 27 – October 01, 2010, Novosibirsk, Russia)
18. Organizer and Chair of the second workshop Knowledge and Ontology \*ELSEWHERE\*, affiliated with the 17th International Conference on Conceptual Structures (ICCS'09) (July 26-31, 2009 Moscow, Russia)
19. Member of the Program Committee of Third International Workshop on Program

Understanding (June 19-22, 2009, Altai Mountains, Russia)

20. Member of the Program Committee of Seven Andrei Ershov International Conference Perspectives of System Informatics (June 15-19, 2009, Novosibirsk, Russia)
21. Organizer and Chair of Knowledge and Ontologies \*ELSEWHERE\*, a satellite workshop of the 11th Russian Conference on Artificial Intelligence (September 29 - October 3, 2008, Dubna, Moscow region, Russia).
22. Member of the Program Committee of the 2007 ACS/IEEE International Conference on Computer Systems and Applications, AICCSA '2007 (May 13-16, 2007, Amman, Jordan)
23. Member of the Program Committee of the Second International Workshop on Program Understanding (July 02-04, 2006, Altai Mountains, Russia)
24. Member of the Program Committee of Six Andrei Ershov International Conference Perspectives of System Informatics (June 27-30, 2006, Novosibirsk, Russia)
25. Member of the Program Committee of the International Workshop on Program Understanding (July 14-16, 2003 Altai Mountains, Russia)
26. Co-editor of a monograph *Applied Cryptography*, Kuzminov T.V., Nauka ( - Science) Publishers, 1999, Novosibirsk, Russia (in Russian)
27. Member of the Program Committee of the Workshop on Logic in Computer Science, organized by University of Technology, Sydney, December 16, 1998. Sydney, Australia.

Selected International Seminars, Workshops and Conferences in which I participated since 2000

- VPT-2017: *5th International Workshop on Verification and Program Transformation* (April 29, 2017, Uppsala, Sweden), a satellite event of the 20<sup>th</sup> ETAPS-2017
- META-2016: *5th International Valentin Turchin Workshop on Metacomputation* (June 27 – July 1, 2016, Pereslavl-Zalessky, Russia)
- International Symposium *Computer Science in Russia*:
  - 11th CSR-2016 (June 9–13, 2016, St. Petersburg, Russia)
  - 6th CSR-2011 (June 14-18, 2011, St. Petersburg, Russia)
  - 5th CSR-2010 (June 16-20, 2010, Kazan, Russia)
  - 4th CSR-2009 (August 18-23, 2009, Novosibirsk, Russia)
- *Spring/Summer Young Researchers' Colloquium on Software Engineering*
  - 10th SYRCoSE-2016 (May 30 – June 1, 2016, Krasnodovo, Moscow region, Russia)
  - 9th SYRCoSE-2015 (May 28-30, 2015, Samara, Russia)
- Ershov Informatics Conference *Perspectives of System Informatics*
  - 10th PSI-2015 (25-27 August 2015, Innopolis, Kazan, Russia)
  - 8th PSI-2011 (June 27 – July 02, 2011, Novosibirsk, Russia)
  - 7th PSI-2009 (June 22-26, 2009, Novosibirsk, Russia)
  - 6th PSI-2006 (June 27-30 2006, Novosibirsk, Russia)
  - 5th PSI-2003 (July 9-12, 2003, Novosibirsk, Russia)
  - 4th PSI-2001 (July 2-6, 2001, Novosibirsk, Russia)
- *Third St.Petersburg Days of Logic and Computability* (August 24-26, 2015, Euler

International Mathematical Institute, St. Petersburg, Russia)

- Kazakh-British Workshop *Embracing Global Computing in emerging economies* (26-28 February 2015, Almaty)
- Vienna Summer of Logic (July 13–26, 2014, Vienna, Austria)
- 25th International Conference on *Computer Aided Verification* (July 13–19, 2013, Saint Petersburg, Russia)
- International Workshop *Fun With Formal Methods*
  - 2nd FWFM-2014 (July 13, 2014, Vienna, Austria)
  - 1st FWFM-2013 (July 13, 2013, Saint Petersburg, Russia)
- International Conference *Mal'tsev Meeting*
  - MM-2014 (November 10-13, 2014, Novosibirsk, Russia)
  - MM-2010 (May 02-06, 2010, Novosibirsk, Russia)
  - MM-2009 (August 24-28, 2009, Novosibirsk, Russia)
- Workshop on *Games, Logic and Security (GIPSy 2011)* (October 25-27, 2011, Rennes, France)
- International Workshop *Concurrency Specification And Programming*
  - CS&P-2011 (September 28-30, 2011, Pultusk, Poland)
  - CS&P-2006 (September 27-29, 2006, Wandlitz, Germany)
- International Symposium on *Temporal Representation and Reasoning (TIME)*
  - 18th TIME-2011 (September 12-14, 2011, Lubeck, Germany)
  - 7th TIME-2004 (July 1-3, 2004, Tatihou, Normandie, France)
- International Conference *Scientific Services & Internet: Supercomputing Centers and Applications* (September 20-25, 2010, Abrau-Dyurso, Russia)
- International Interdisciplinary Conference *Philosophy, Mathematics, Linguistics: Aspects of Interaction* (November 17-22, 2009, St. Petersburg, Russia)
- 17th *International Conference on Conceptual Structures ICCS'09* (July 26-31, 2009, Moscow, Russia)
- International Workshop on *Description Logics*
  - 21st DL-2008 (May 13-16, 2008, Dresden, Germany)
  - 20<sup>th</sup> DL-2007 (June 8-10, 2007, Brixen-Bressanone, Italy)
- 6th International Semantic Web Conference ISWC-2007 and the 2nd Asian Semantic Web Conference ASWC-2007 (November 11-15, 2007, Busan, Korea)
- 3rd International Conference on *Next Generation Web Services Practices NWeSP'07* (October 29-31, 2007, Seoul, Korea)
- 5th International Conference on *Concept Lattices and Their Applications CLA-2007* (October 24-26, 2007, Montpellier, France)
- Workshop on *Logic, Rationality and Interaction LORI* (August 5-9, 2007, Beijing, China)
- Workshop on *Logic and Collective Decision Making LCD'07* (March 13-14, 2007, Lille, France)

- International Symposium *Grand Challenges of Informatics* (Budapest, Hungary, September 19-20, 2006)
- Dagstuhl Seminar *Software Verification: Infinite-State Model Checking and Static Program Analysis* (February 19-24, 2006, Dagstuhl, Germany)
- 4th International Conference on *Formal Concept Analysis* (February 13-17, 2006, Dresden, Germany)
- 9th *Asian Logic Conference* (August 16-19, 2005, Novosibirsk, Russia)
- 10th conference on *Theoretical Aspects of Rationality and Knowledge TARK-X* (June 10-12, 2005, Singapore)
- 1st KAIST International Symposium on *Enhancing University Mathematics Teaching* (May 12-16, 2005, Daejeon, Korea)
- National ICT Australia, *Inaugural Formal Methods Program Workshop* (May 29-31, 2003, Sydney, Australia)
- Workshop *Fixed Points in Computer Science* (FICS)
  - FICS-2002, a satellite workshop to Logic In Computer Science LICS-2002 (July 20-21, 2002, Copenhagen, Denmark)
  - FICS-2001, a satellite Workshop to Principles, Logics and Implementations of high-level programming languages PLI-2001 (September 8, 2001, Florence, Italy)
- *Automata and Finite Model Theory*, a workshop of the 13th European Summer School in Logic, Language and Information ESSLLI 2001 (August 19-24, 2001, Helsinki, Finland)
- *Logic and Games*, a workshop of the 13th European Summer School in Logic, Language and Information ESSLLI 2001 (August 13-18, 2001, Helsinki, Finland)
- International Conference on Industrial Survival Strategy for Next Generation Information Technology (June 21-22, 2001, Seoul, Korea)
- APLAS-2000: Asian Workshop on Programming Languages and Systems, (December 18-20, 2000, Singapore)
- *Formal Methods Elsewhere*, a satellite workshop of FORMal description TEchniques for distributed systems and communication protocols FORTE-2000 (October 10, 2000, Pisa, Italy)
- AiML-ICTL-2000: *Advances in Modal Logic and International Conference on Temporal Logic*, (October 4-7, 2000, Leipzig, Germany)

#### Personal grants since 2000:

- 2001 - travel grant of FOLLI
- 2002 - travel grant of FloC'02
- 2003 – Erskin Fellowship
- 2007 – travel grant of Russian Basic Research Foundation
- 2011 - DAAD Research Fellowship

#### Some people with whom I work(ed) and related research topics

- Scientific Adviser of my Master and Ph.D. Thesis was Valery A. Nepomniaschy. In 1982-90 we developed Program Schemata Technique for Propositional Dynamic Logic.

- In 1990-2002 a focus of our collaboration with ValeryA. Nepomniaschy moved to design of new FDT on base of program logics and to specification and verification of distributed systems.
- In 1998-99 we worked together with Ron van der Meyden on model checking knowledge and linear time logic.
- In 2000-05 we worked together with Kwang Yi on model checkers of program logics and better education on theory of Computer Science.
- In 2003-2005 we worked together with Egor Kouzmin and Valery Sokolov on well-structured transition systems and intuitionistic modal logic.
- In 2005-2007 we studied Formal Concept Analysis and Description Logic together with Dmitry E. Palchunov and Sergey O. Kuznetsov, Karl Wolff, and Bernhard Ganter.
- Since 2002 we with Natalia Garanina learn the model checking knowledge, actions, and branching time and their applications for reasoning about multiagent algorithms and systems.
- In 2007-2008 we work together with Sang Yong Han on combination of Description Logic and Formal Concept Analysis for Knowledge Representation and Reasoning.
- In 2012-2015 I was a co-advisor for Ph.D. student Aizhan Satykbayeva; we worked together on new abstract data types for representation knowledge in program analysis and in multiagent systems.

Some former Master and Ph.D. students:

- Dr. Sergey Berezin (alternative spelling: Berrezine);
- Mr. Evgeny Bodin.;
- Dr. Natalia Garanina;
- Dr. Aizhan Satykbayeva (alternative spelling: Satekbayeva).

Current projects with external funding in which I am involved

Title	Performing Institution	Duration	Sponsor	Principal Investigator	Responsibility
Platform-independent approach to formal specification and verification of standard mathematical functions	A.P. Ershov Institute of Informatics Systems	2017-2019	Russian Basic Research Foundation	Dr. N. Shilov	General management and research on formal specification and verification.
Methods for generation of formal models and requirements from technical documentation presented in a	A.P. Ershov Institute of Informatics Systems	2017-2019	Russian Basic Research Foundation	Dr. N. Garanina	Research on expressibility of propositional program logics.

natural language and their verification					
Educational project “Graduate Program on Logic in Computer Science”	Novosibirsk State University	2017-2018	Vladimir Potanin Foundation	Dr. S. Oditsov	Curricula development and teaching of topics on formal program semantics, specification and verification.

### Past Projects with external funding in which I was involved

Educational project “Graduate Course on Formal Methods in Software Engineering”	Novosibirsk State University	2016-2017	Vladimir Potanin Foundation	Dr. V. Schelekhov	Curricula development and teaching of topics on Formal Models of Concurrency and Model Checking
Research on Program Schemata Technique for propositional program logics	A.P. Ershov Institute of Informatics Systems	2013-2015	Russian Basic Research Foundation	Dr. N. Shilov	General management and research on program logics and schemata.
Research of Multiagent Systems in Uncertainty	Institute for Systems Analysis of Russian Academy of Sciences	2013-2015	Russian Basic Research Foundation	Dr. M. Valiev	Research on privacy issues of multiagent algorithms, their correctness and efficiency.
Research on formal Models for analysis of programs with Dynamic Memory	Nazarbayev University	2014	Nazarbayev University Research Office	Dr. N. Shilov	General management and research on Separation logic and alias calculus.
Ontology Design and Development on base of Conceptualization by means of Logic Description Languages	Sobolev Institute of Mathematics, and Institute of Philosophy of Russian Academy of Science	2012-2013	Presidium of Russian Academy of Science	Academician Yu. Ershov and Prof. V. Tseloshev	Research on Description Logic, on Classification of Computer Languages, design and prototyping of Knowledge Portal on Computer Languages Classification.

Intellectual Information Systems: Mathematical and Methodological Aspect	A.P. Ershov Institute of Informatics Systems	2012-2013	Presidium of Russian Academy of Science	Prof. A. Marchuk	Design, formal verification and publication of multiagent algorithms for discrete resource allocation.
Research on intelligent multi-agent systems: behavioral, logical and linguistic aspects	Keldysh Institute of Applied Mathematics of Russian Academy of Sciences	2010-2012	Russian Basic Research Foundation	Dr. M. Valiev	Research on multiagent algorithms, their correctness and efficiency.
SAT-based automatic program verification	A.P. Ershov Institute of Informatics Systems	2009-2011	Russian Basic Research Foundation	Dr. N. Shilov	General management and research on program logics, specification, and verification, applications of SAT-solvers.
Formal languages and methods of specification, analysis and synthesis of information systems	A.P. Ershov Institute of Informatics Systems	2009-2011	Presidium of Russian Academy of Science	Prof. A. Marchuk	Research on Knowledge Representation and Reasoning.
Research on Computer Languages Classification	A.P. Ershov Institute of Informatics Systems	2008-2010	Russian Basic Research Foundation	Prof. A. Marchuk	Research on computer language's concepts, their representation and reasoning.
Integration of Ontological, Logical, and Linguistic Models and Methods for Design and Development of Information Systems	A.P. Ershov Institute of Informatics Systems	2006-2008	Presidium of Russian Academy of Science	Prof. A. Marchuk	Research on Knowledge Representation and Reasoning.
Research on verification and specification methods for models of program systems	A.P. Ershov Institute of Informatics Systems	2006-2008	Russian Basic Research Foundation	Dr. N. Shilov	General management and research on program logics and verification.
Conceptual and Model Theoretic	Sobolev Institute of Mathematics	2005-2008	Deutsche Forschungsgemeinschaft	Dr., Prof. K.E. Wolf	Research on description logic



Structures for Knowledge Processing			(German Research Foundation) and Russian Basic Research Foundation	Dr., Prof. D.I. Palchunov	and logics of knowledge, actions and time.
Typical Components Base Creation for Development of Experimental Systems of Functional Programming	A.P. Ershov Institute of Informatics Systems	2005-2007	Russian Basic Research Foundation	Dr. L.V. Gorodnya	Research on proof-caring code and verifying compiler.
Integration of Symbolic Boolean Transformations, Model Checking and Proving Properties of Boolean Functions	Novosibirsk State University	2003-2004	Russian Ministry of Education	Dr. N.A. Kalinina	Research on model checking for program logics.
Research On Program Analysis System	Korean Advanced institute of Science and Technology	2000-2001	Korean National Creative Research Initiative Center	A/Prof. K. Yi	Research on program logics
Knowledge Based Programming of Distributed Systems: From Specification to Implementation	University of technology, Sydney	1998-1999	Australian Research council	A/Prof. R. van der Meyden	Research on program logics
Methods and Tools for Verification and Analysis of Distributed Systems	A.P. Ershov Institute of Informatics Systems	1996-1998	International Association for Promotion of Cooperation with Scientists from Independent States of Former Soviet Union and Russian Basic Research Foundation	Prof. Ph. Schnoebelen and Prof. V.A. Nepomnjasc hy	Research on applications of program logics
Verification of Distributed Systems	A.P. Ershov Institute of Informatics Systems	1995	International Scientific Foundation and	Prof. Ph. Schnoebelen and Prof. V.A.	Research on applications of program logics

			Russian Basic Research Foundation;	Nepomnjasc hy	
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Written by Nikolay V. Shilov

April 30, 2018