

Igor KONNOV

Location: Vienna, Austria
(considering remote work, no relocation)
Homepage: www.konnov.phd
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GitHub: [<https://github.com/konnov>]

Languages: English (fluent), German (ÖSD Zertifikat B2), Russian (mother tongue), French (beginner)

Research interests: model checking, parameterized verification, verification of distributed algorithms, fault tolerance, blockchains, temporal logic of actions (TLA⁺)

Appointments-Positions-Businesses

Single-Person Company, Vienna, Austria:

Jan 2024 – present. Independent Security and Formal Methods Researcher

Informal Systems AG, Vienna, Austria:

Jan 2020 – Dec 2023. Principal Research Scientist

Oct 2022 – Dec 2023. Product Owner of Quint and Apalache

Jan 2020 – Oct 2022. Project Lead of the Apalache Team

Interchain Foundation (Switzerland), working remotely from Vienna, Austria:

Oct 2019 – Dec 2020. Senior Research Scientist

INRIA Nancy — Grand Est, Nancy, France:

Mar 2018 – Sep 2019. Researcher (permanent, chargé de recherche de classe normale). On leave of absence.

Vienna University of Technology (TU Wien), Faculty of Informatics, Austria:

Jan 2016 – Feb 2018. Postdoctoral researcher, principal investigator in the WWTF project APALACHE

Dec 2011 – Dec 2015. Postdoctoral assistant professor (Universitätsassistent, limited contract)

Jul 2011 – Dec 2011. Postdoctoral researcher (Projektassistent)

Moscow State University (MSU), Faculty of Computational Mathematics and Cybernetics, Russia:

Jan 2010 – Jun 2011. Junior research fellow (m.n.s.)

Dec 2006 – Jan 2010. Pre- and postdoctoral research and teaching assistant

Sytech LLC, Russia: **2006–2010**, Part-time systems architect, **2004–2006**, Software developer

IFirst LLC, Russia: **01.09.2002–15.09.2003**, Part-time software engineer

Higher education, degrees, and titles

Dec 2019. Vienna University of Technology (TU Wien), Austria: Privatdozent — Habilitation in Computer Science

Oct 2003– Nov 2008. Moscow State University, Russia: Ph.D. in Computer Science (awarded in **Feb 2009**)

Sep 1998– Jul 2003. Moscow State University, Russia: Specialist (approx. MSc) in Applied Math. & Informatics

With distinction, 97% are the best score: avg. score 1.06 (German scale) = avg. score 4.87 (Russian scale)

Project acquisition and participation

2024. Stellar Community Fund. Project Solarkraft <i>runtime monitoring tool for Soroban</i>	50k USD Igor Konnov (company)
Role: Team lead of independants	
2021–2023. Vienna Business Agency. Project Atlantic <i>A TLA⁺ Tool Portfolio for Reliable Distributed Systems</i>	181k€ Informal Systems
Role: scientific leader, Project leader: J.Widder	
2016–2019. WWTF: Vienna Science and Technology Fund. Project ICT15–103 APALACHE <i>Abstraction-based Parameterized TLA Checker</i>	539k€ TU Wien
Role: <u>principal investigator</u> , with: J.Widder (co-PI), H. Veith (core team) Acceptance rate: <u>10 out of 137 proposals (approx. 7%)</u>	
2015–2018. FWF: Austrian National Research Network S11403-N23 SHiNE <i>Systematic Methods in Systems Engineering</i>	TU Wien 625k€
Role: researcher, Coordinator: R. Bloem (3.7 Mio. €), PI: H. Veith	
2011–2014. WWTF: Vienna Science and Technology Fund. Project PROSEED <i>Proof Seeding for Software Verification</i>	598k€ TU Wien
Role: researcher, PI: H. Veith	
2010–2014. FWF: Austrian National Research Network S11403-N23 RiSE <i>Rigorous Systems Engineering</i>	TU Wien 582.8k€
Role: researcher, Coordinator: R. Bloem (3.7 Mio. €), PI: H. Veith	
2010–2012. Russian Federal Special-Purpose Programme, Project 14.740.11.0399 <i>Developing a Prototype for Computer Simulation of Real-Time Distributed Systems</i>	approx. 200k€ MSU
Role: responsible for coordination, research agenda, and report writing, PI: R.L. Smeliansky	
2009–2011. RFBR: Russian Fund for Basic Research, Project Nr. 09–01–00277-a <i>Structural and Semantic Analysis Using Formal Models of Sequential and Parallel Processes</i>	approx. 32k€ MSU
Role: researcher, PI: R.I. Podlovchenko	
2006–2009. INTAS: EU research cooperation with the New Independent States, Project Nr. 05–1000008–8144 <i>Practical Formal Verification Using Automated Reasoning and Model Checking</i>	MSU
Role: researcher, Coordinator: T. Jebelian, PI: V.E. Plisko	
2006–2008. RFBR: Russian Fund for Basic Research, Project Nr. 06–01–00106-a <i>Formal Models of Sequential and Parallel Processes and the Analysis of Their Semantic Properties</i>	approx. 52k€ MSU
Role: researcher, PI: R.I. Podlovchenko	

R&D projects with industry and state companies

2009–2010. <i>Obfuscation techniques on intermediate code representation</i>	Computer Systems Lab/MSU
Role: team lead of 1 master student and 1 PhD student, PI: R.L. Smeliansky	
2007–2008. <i>Obfuscation techniques for C++</i>	Computer Systems Lab/MSU
Role: team lead of 1 master student and 1 PhD student, PI: R.L. Smeliansky	
2008. <i>Teachable static analysis workbench</i>	The Open Web Application Security Project (OWASP)
Role: developer, PI: D.D. Kozlov	

2007–2008. *Static analysis of python web applications for vulnerabilities*

Computer Systems Lab/MSU

Role: developer, **PI:** R.L. Smeliansky

Selected invited talks & lectures

VTSA23, Nancy/France

tutorial *Specifying blockchain protocols with TLA+ and Quint and checking them with Apalache* **August 2023**

FORTE20, Valletta/Malta – online

tutorial *Parameterized Verification with Byzantine Model Checker* **June 2020**

VMCAI Winter School, New Orleans, LA/USA

tutorial *Model checking of distributed algorithms: from classics towards Tendermint blockchain* **Jan 2020**

Dagstuhl Seminar 18211: “Formal Methods and Fault-Tolerant Distributed Computing: Forging an Alliance”

Dagstuhl/Germany, invited tutorial *What my computer can find about your distributed algorithm* **May 2018**

Bertrand Meyer’s Vericlub seminar, U. Toulouse, Toulouse/France

invited seminar talk *Model checking of threshold-guarded distributed algorithms: beyond reachability* **Nov 2016**

Rigorous System Design Laboratory, EPFL, Lausanne/Switzerland

invited seminar talk *Model checking of fault-tolerant distributed algorithms: safety and liveness* **Sep 2016**

Workshop on Program Semantics, Specification & Verification at CSR’16, St. Petersburg/Russia **Jun 2016**

invited talk *Model checking of threshold-based fault-tolerant distributed algorithms*

Spring School Logic & Verification, Vienna/Austria

lectures on *Complete parameterized & bounded model checking of threshold-based fault-tolerant distributed algorithms* **Apr 2016**

Amazon, Herndon, VA/USA

invited talk *Model checking of threshold-based fault-tolerant distributed algorithms* **Jun 2015**

Dagstuhl Seminar: “Distributed Cloud Computing”, Dagstuhl/Germany

talk *Model checking of threshold-based fault-tolerant distributed algorithms* **Feb 2015**

Tools & Methods of Program Analysis’14, Kostroma/Russia

invited talk *Parameterized model checking of fault-tolerant distributed algorithms by abstraction* **Nov 2014**

Summer School’14: “Verification Technology, Systems & Applications”, Luxembourg

lectures on *Model checking of fault-tolerant distributed algorithms* (together with Helmut Veith) **Oct 2014**

Dagstuhl Seminar: “Formal Verification of Distributed Algorithms”, Dagstuhl/Germany

invited talk *Counter attack on Byzantine generals* **Apr 2013**

Concurrency Seminar, Computing Laboratory, Oxford/UK

invited talk *An invariant-based approach to the verification of asynchronous parameterized networks* **Feb 2011**

Teaching experience

Vienna University of Technology (TU Wien)

2013–2017. Computer Aided Verification

Master students, compulsory, lectures & practicals, 3 ECTS

In 2017, held the lecture course. Until 2017, read parts of the lecture course, teaching assistance.

- 2013–2017.** Program & Systems Verification Bachelor students, compulsory, lectures & practicals, 6 ECTS
Teaching assistance
- 2011–2015.** Formal Methods of Informatics Master students, compulsory, lectures & practicals, 6 ECTS
Teaching assistance

Moscow State University (MSU)

- 2008–2010.** Software model checking (Dr. Savenkov) 8th semester, compulsory, lectures & seminars, 32 hrs.
Designed the course together with K. Savenkov, read parts of the lecture course, teaching assistance
- 2004.** Seminars on The C Programming Language and UNIX 3rd semester, compulsory, 32 hrs.
Instructed at all seminars (approx. 20 students)
- 2005.** Seminars on Syntax Analysis and C++ 4th semester, compulsory, 32 hrs.
Instructed at all seminars (approx. 20 students)
- 2004.** Operating Systems (Prof. Terekhov) 3rd semester, compulsory, lectures, 54 hrs.
Teaching assistance
- 2003–2011.** Computer Networks (Prof. Smeliansky) 6th semester, compulsory, lectures, 64 hrs.
Teaching assistance
- 2003–2004.** The Java Programming Language optional, lectures, 32 hrs.
Read parts of the lecture course, teaching assistance
- 2003–2004.** MSU math entrance exams compulsory
Corrected written math exams, participated in the oral math exams

Kazakhstan branch of Moscow State Univ., Astana/Kazakhstan

- 2011.** Software model checking 8th semester, compulsory, lectures & seminars, 32 hrs.
held the lecture course and the seminars

Tashkent University, Tashkent/Uzbekistan

- 2011–2013.** Participated in EU project CANDI: Teaching Competency & Infrastructure for e-Learning and Retraining

Advising

- PhD students (TU Wien): Associated Faculty of Doctoral College LogiCS [logic-cs.at]
- 2016–present.** Jure Kukovec (advisor) with Priv.-Doz. Dr. Josef Widder
- 2016–2023.** Dr. Thanh Hai Tran (advisor) with Priv.-Doz. Dr. Josef Widder
- 2015–2019.** Drⁱⁿ. Marijana Lazić (co-advisor) with Priv.-Doz. Dr. Josef Widder
Reduction techniques for parameterized model checking and synthesis of fault-tolerant distributed algorithms
- 2011–2014.** Drⁱⁿ. Annu Gmeiner (informal co-advisor) advisors: Prof. Helmut Veith and Priv.-Doz. Dr. Josef Widder
Parameterized model checking of fault-tolerant distributed algorithms

Master students:

- 2019.** Viktor Sergeev (Univ. of Lorraine)
Bounded Model Checking of Liveness Properties of TLA+ Specifications co-advised with Stephan Merz
- 2016.** Jure Kukovec (Univ. Ljubljana)
Extensions of Threshold Automata for Reachability in Parameterized Systems co-advised with Prof. Andrej Bauer
- 2015–2016.** Thanh Hai Tran (TU Wien)
User-guided Predicate Abstraction of TLA+ Specifications co-advised with Prof. Helmut Veith
- 2009–2011.** Alexander Mischenko (MSU)
Static Type Analysis of Python Programs on Bytecode Level
- 2007–2009.** Denis Sigaev (MSU)
Detection of Programs Protected from Reverse Engineering co-advised with A. Kachalin
- 2008.** Alexey Schevchenko (MSU)
Application of Regular Model Checking to Infinite State Systems
- 2007.** Peter Bulychev (MSU)
Game-Theoretic Methods of Protocol Verification co-advised with Prof. Vladimir Zakharov

Bachelor students:

- 2013.** Sebastian Neumaier (TU Wien) *A Simple Simulation Language for Distributed Algorithms*
- 2011.** Andrey Babak and Anton Artyomov (MSU) *Static Analysis of Python Programs*

Community service

Conference organization:

- PC co-chair of CONCUR 2020 ~~in Vienna~~ – online (owing to COVID19) [concur2020.forsyte.at]
- Artifact evaluation chair: Computer-Aided Verification (CAV'18) [cavconference.org/2018]
- Workshop chair: Computer-Aided Verification (CAV'13) [cav2013.forsyte.at]

Program Committees:

- 9th International Conference on Rigorous State Based Methods (ABZ'23) Nancy, FR
- 20th International Workshop on Satisfiability Modulo Theories (SMT'22) Haifa, Israel
- 27th International SPIN Symposium on Model Checking of Software (SPIN'21) Aarhus, DK
- 2nd, 3rd, 4th workshops on Formal Methods for Blockchains 2020 – 2022 Online; Los Angeles, CA; Haifa, Israel
- ACM Symposium on Principles of Distributed Computing (PODC'18) London/UK
- Formal Methods in Computer-Aided Design (FMCAD) 2017 & 2018 Vienna/Austria & Austin/TX, US
- Computer Aided Verification'16 (External Reviewer Committee) Toronto/Canada
- Symbolic and Numeric Algorithms for Scientific Computing 2013, 2016, and 2017 Timisoara/Romania
- Stabilization, Safety, and Security of Distributed Systems'15 Edmonton/Canada
- Intl. Conf. on Verification & Evaluation of Computer & Comm. Systems (VECoS'18) Grenoble/France
- Intl. Symposium on Formal Approaches to Parallel and Distributed Systems
(4PAD) 2018 & 2019 Orléans/France & Dublin/Ireland
- Workshop on Methods and Tools for Rigorous System Design (MeTRiD'18) Thessaloniki/Greece
- Tools & Methods of Program Analysis 2015 & 2017 St. Petersburg & Moscow/Russia

Workshop on Program Semantics, Specification, and Verification 2017–2019

Russia

Parallel, Distributed, and Network-based Processing'17 (Formal approaches track)

St. Petersburg/Russia

Journal and book chapter reviews: FMSD (2018), Computing (2018), LMCS (2017), ACM ToCL (2017), MAIS (2017), MiCS (2017), TIME (2015),

Handbook of Model Checking (eds. E. Clarke, T. Henzinger, H. Veith)

Guest editor: Special issue on Computer Aided Verification'13 in Formal Methods in System Design (Springer)

(with Helmut Veith and Natasha Sharygina)

External reviewer: PODC'21, ITP'21, ISOLA'20, FSTTCS'20, IFM'20, FSTTCS'17, QEST'17, TACAS'17, STACS'17, VMCAI'17, MARS'17, SYNASC'17, ICFEM'16, CONCUR'16, IJCAR'16, LICS'16, EuroPar'16, AAMAS'16, CAV'15, FMCAD'15, TACAS'15, FoSSaCS'15, CAV'14, SAS'14, GandALF'14, ESOP'14, HVC'14, CAV'13, LATA'13, SSS'13, CAV'12, NFM'12, SPIN'12, VMCAI'12, FMICS'11, CSL'11

PhD thesis reviewer. Joshua Schmidt: New Applications and Techniques for Constraint Programming in B. Heinrich-Heine-Universität Düsseldorf, 2023

Student Award Committee. VCLA International Student Awards 2014–2015

Tools

2020–present. QUINT: engineer-friendly specification language [<https://github.com/informalsystems/quint>]

2016–present. APALACHE: symbolic model checker for TLA⁺ [<https://apalache.informal.systems>]

2012–2019. BYMC: model checker of parameterized fault-tolerant distributed algorithms
[<https://github.com/konnov/bymc>]

2004–2009. CHEAPS: model checker of parameterized asynchronous distributed systems

Scholarships & sponsored summer schools

2009–2010. Fellowship for young researchers: Faculty of Computational Mathematics and Cybernetics, MSU

2009. Marktoberdorf Summer School *Engineering Methods and Tools for Software Safety and Security*

2008. Marktoberdorf Summer School *Logics and Languages for Reliability and Security*

2005. Microsoft Summer School *Mathematics and Programming: from Theory Towards Practice*

2003–2005. PhD student scholarship: LSI Logic

Publications and talks

Book

- [1] R. Bloem, S. Jacobs, A. Khalimov, I. Konnov, S. Rubin, H. Veith, and J. Widder. *Decidability of Parameterized Verification*. Vol. 6. 1. Morgan & Claypool, 2015, pp. 1–170. DOI: 10.2200/S00658ED1V01Y201508DCT013.

PhD and Habilitation

- [2] I. Konnov. “Techniques and Tools for Automated Verification of Fault-tolerant and Parameterized Distributed Systems”. Habilitation in computer science. Technische Universitaet Wien (TU Wien), Faculty of Informatics, Dec. 2018, pp. 1–235. URL: <https://konnov.github.io/doc/konnov-habil19.pdf>.
- [3] I. V. Konnov. “Parameterized Model Checking of Distributed Systems”. In Russian. PhD thesis in Computer Science (Kandidat physiko-matematicheskikh nauk 05.13.11). PhD thesis. Lomonosov Moscow State University, Faculty of Computational Mathematics and Cybernetics, Nov. 2008, pp. 1–198. URL: http://lvc.cs.msu.ru/~konnov/publications/konnov_phd_thesis.pdf.

Proceedings Editor

- [4] I. Konnov and L. Kovács, eds. *31st International Conference on Concurrency Theory, CONCUR 2020, September 1–4, 2020, Vienna, Austria (Virtual Conference)*. Vol. 171. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2020.

Book chapter

- [5] A. Gmeiner, I. Konnov, U. Schmid, H. Veith, and J. Widder. “Tutorial on Parameterized Model Checking of Fault-Tolerant Distributed Algorithms”. In: *Formal Methods for Executable Software Models*. LNCS. Springer, 2014, pp. 122–171. DOI: 10.1007/978-3-319-07317-0_4.

Invited papers

- [6] I. Konnov, M. Kuppe, and S. Merz. “Specification and Verification with the TLA+ Trifecta: TLC, Apalache, and TLAPS”. In: *ISoLA*. Vol. 13701. Lecture Notes in Computer Science. Springer, 2022, pp. 88–105.
- [7] S. Braithwaite, E. Buchman, I. Konnov, Z. Milosevic, I. Stoilkovska, J. Widder, and A. Zamfir. “Tendermint Blockchain Synchronization: Formal Specification and Model Checking”. In: *ISOLA, Part I*. 2020, pp. 471–488. DOI: 10.1007/978-3-030-61362-4_27.
- [8] I. Konnov, M. Lazic, I. Stoilkovska, and J. Widder. “Tutorial: Parameterized Verification with Byzantine Model Checker”. In: *FORTE*. 2020, pp. 189–207. DOI: 10.1007/978-3-030-50086-3_11.
- [9] I. Konnov and J. Widder. “ByMC: Byzantine Model Checker”. In: *Leveraging Applications of Formal Methods, Verification and Validation. Distributed Systems*. Cham: Springer International Publishing, 2018, pp. 327–342. DOI: 10.1007/978-3-030-03424-5_22. URL: <https://hal.inria.fr/hal-01909653>.
- [10] I. Konnov, H. Veith, and J. Widder. “What You Always Wanted to Know About Model Checking of Fault-Tolerant Distributed Algorithms”. In: *Perspectives of System Informatics: PSI 2015, in Memory of Helmut Veith, Revised Selected Papers*. Springer, 2016, pp. 6–21. DOI: 10.1007/978-3-319-41579-6_2.

Journal articles

- [11] I. Konnov, M. Lazic, I. Stoilkovska, and J. Widder. “Survey on Parameterized Verification with Threshold Automata and the Byzantine Model Checker”. In: *Log. Methods Comput. Sci.* 19.1 (2023).
- [12] T. Tran, I. Konnov, and J. Widder. “A case study on parametric verification of failure detectors”. In: *Log. Methods Comput. Sci.* 19.1 (2023).
- [13] I. Stoilkovska, I. Konnov, J. Widder, and F. Zuleger. “Verifying safety of synchronous fault-tolerant algorithms by bounded model checking”. In: *Int. J. Softw. Tools Technol. Transf.* 24.1 (2022), pp. 33–48.
- [14] N. Bertrand, I. Konnov, M. Lazic, and J. Widder. “Verification of randomized consensus algorithms under round-rigid adversaries”. In: *Int. J. Softw. Tools Technol. Transf.* 23.5 (2021), pp. 797–821.
- [15] J. Kukovec, T.-H. Tran, and I. Konnov. “Extracting symbolic transitions from TLA+ specifications”. In: *Science of Computer Programming* 187 (2020), p. 102361. DOI: <https://doi.org/10.1016/j.scico.2019.102361>.
- [16] I. Konnov. “**Review:** Edmund M. Clarke, Thomas A. Henzinger, Helmut Veith, and Roderick Bloem (eds): Handbook of model checking - Springer International Publishing AG, Cham, Switzerland, 2018”. In: *Formal Asp. Comput.* 31.4 (2019), pp. 455–456. DOI: 10.1007/s00165-019-00486-z.
- [17] I. Konnov, J. Kukovec, and T. Tran. “TLA+ model checking made symbolic”. In: *PACMPL* 3.OOPSLA (2019), 123:1–123:30. URL: <https://doi.org/10.1145/3360549>.

- [18] I. Konnov, M. Lazic, H. Veith, and J. Widder. “Para²: Parameterized Path Reduction, Acceleration, and SMT for Reachability in Threshold-Guarded Distributed Algorithms”. In: *Formal Methods in System Design* (2017). **(Extended version of the conference paper I. Konnov, H. Veith, J. Widder. “SMT and POR Beat Counter Abstraction: Parameterized Model Checking of Threshold-Based Distributed Algorithms”. In Computer-Aided Verification, vol. 9206, LNCS, 2015, pp. 85–102.)** DOI: 10.1007/s10703-017-0297-4. URL: <https://link.springer.com/article/10.1007/s10703-017-0297-4>.
- [19] I. V. Konnov, H. Veith, and J. Widder. “On the completeness of bounded model checking for threshold-based distributed algorithms: Reachability”. In: *Information and Computation* 252 (2017). **(Extended version of the conference paper I. Konnov, H. Veith, J. Widder. “On the Completeness of Bounded Model Checking for Threshold-Based Distributed Algorithms: Reachability”. In Concurrency Theory – 25th International Conference, CONCUR, 2014, pp. 125–140), pp. 95–109.** DOI: 10.1016/j.ic.2016.03.006.
- [20] R. Bloem, S. Jacobs, A. Khalimov, I. Konnov, S. Rubin, H. Veith, and J. Widder. “Decidability in Parameterized Verification”. In: *ACM SIGACT News* 47.2 (2016), pp. 53–64. DOI: 10.1145/2951860.2951873.
- [21] D. Y. Volkanov, V. A. Zakharov, D. A. Zorin, V. V. Podymov, and I. V. Konnov. “A combined toolset for the verification of real-time distributed systems”. In: *Programming and Computer Software* 41.6 (2015), pp. 325–335. DOI: 10.1134/S0361768815060080.
- [22] I. Konnov, V. Podymov, D. Volkanov, V. Zakharov, and D. Zorin. “How to Make a Simple Tool for Verification of Real-Time Systems”. In: *Automatic Control and Computer Sciences* 48.7 (2014), pp. 534–542. DOI: 10.3103/S0146411614070232.
- [23] I. V. Konnov. “On application of weaker simulations to parameterized model checking by network invariants technique”. In: *Automatic Control and Computer Sciences* 44.7 (2010), pp. 378–386. DOI: 10.3103/S0146411610070035.
- [24] I. V. Konnov and V. A. Zakharov. “An invariant-based approach to the verification of asynchronous parameterized networks”. In: *Journal of Symbolic Computation* 45.11 (2010), pp. 1144–1162. DOI: 10.1016/j.jsc.2008.11.006.
- [25] I. V. Konnov and V. A. Zakharov. “Using Adaptive Symmetry Reduction for LTL Model Checking”. In Russian. In: *Modelling and Analysis of Information Systems* 17.4 (2010), pp. 78–87. URL: http://www.mathnet.ru/php/archive.phtml?wshow=paper&jrnid=mais&paperid=38&option_lang=eng.
- [26] I. V. Konnov and V. A. Zakharov. “An Approach to the Verification of Symmetric Parameterized Distributed Systems”. In: *Programming and Computer Software* 31.5 (2005), pp. 225–236. DOI: 10.1007/s11086-005-0034-4.

Peer-reviewed conference proceedings

- [27] R. Otoni, I. Konnov, J. Kukovec, P. Eugster, and N. Sharygina. “Symbolic Model Checking for TLA+ Made Faster”. In: *TACAS*. Vol. 13993. LNCS. Springer, 2023, pp. 126–144.
- [28] N. Bertrand, V. Gramoli, I. Konnov, M. Lazic, P. Tholoniati, and J. Widder. “Brief Announcement: Holistic Verification of Blockchain Consensus”. In: *PODC*. ACM, 2022, pp. 424–426.
- [29] N. Bertrand, V. Gramoli, I. Konnov, M. Lazic, P. Tholoniati, and J. Widder. “Holistic Verification of Blockchain Consensus”. In: *DISC*. Ed. by C. Scheideler. Vol. 246. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2022, 10:1–10:24.
- [30] I. Stoilkovska, I. Konnov, J. Widder, and F. Zuleger. “Eliminating Message Counters in Synchronous Threshold Automata”. In: *VMCAI*. Vol. 12597. LNCS. Springer, 2021, pp. 196–218.
- [31] T. Tran, I. Konnov, and J. Widder. “A Case Study on Parametric Verification of Failure Detectors”. In: *FORTE*. Vol. 12719. LNCS. Springer, 2021, pp. 138–156.
- [32] I. Stoilkovska, I. Konnov, J. Widder, and F. Zuleger. “Eliminating Message Counters in Threshold Automata”. In: *ATVA*. 2020, pp. 196–212. DOI: 10.1007/978-3-030-59152-6_11.
- [33] T. Tran, I. Konnov, and J. Widder. “Cutoffs for Symmetric Point-to-Point Distributed Algorithms”. In: *NETYS*. Vol. 12129. LNCS. Springer, 2020, pp. 329–346.
- [34] N. Bertrand, I. Konnov, M. Lazic, and J. Widder. “Verification of Randomized Consensus Algorithms Under Round-Rigid Adversaries”. In: *CONCUR 2019*. Vol. 140. LIPIcs. 2019, 33:1–33:15. DOI: 10.4230/LIPIcs.CONCUR.2019.33.
- [35] I. Stoilkovska, I. Konnov, J. Widder, and F. Zuleger. “Verifying Safety of Synchronous Fault-Tolerant Algorithms Bounded Model Checking”. In: *TACAS*. 2019, pp. 357–374. DOI: 10.1007/978-3-030-17465-1_20.
- [36] J. Kukovec, I. Konnov, and J. Widder. “Reachability in Parameterized Systems: All Flavors of Threshold Automata”. In: *29th International Conference on Concurrency Theory, CONCUR 2018, September 4-7, 2018, Beijing, China*. 2018, 19:1–19:17. DOI: 10.4230/LIPIcs.CONCUR.2018.19. URL: <https://doi.org/10.4230/LIPIcs.CONCUR.2018.19>.

- [37] J. Kukovec, T. Tran, and I. Konnov. “Extracting Symbolic Transitions from TLA⁺ Specifications”. In: *Abstract State Machines, Alloy, B, TLA, VDM, and Z*. 2018, pp. 89–104. DOI: 10.1007/978-3-319-91271-4_7. URL: http://forsyte.at/wp-content/uploads/abz2018_full.pdf.
- [38] I. V. Konnov, M. Lazic, H. Veith, and J. Widder. “A short counterexample property for safety and liveness verification of fault-tolerant distributed algorithms”. In: *Proceedings of the 44th ACM SIGPLAN Symposium on Principles of Programming Languages, POPL 2017, Paris, France, January 18-20, 2017*. 2017, pp. 719–734. URL: <http://dl.acm.org/citation.cfm?id=3009860>.
- [39] I. V. Konnov, J. Widder, F. Spegni, and L. Spalazzi. “Accuracy of Message Counting Abstraction in Fault-Tolerant Distributed Algorithms”. In: *Verification, Model Checking, and Abstract Interpretation - 18th International Conference, VMCAI 2017, Paris, France, January 15-17, 2017, Proceedings*. 2017, pp. 347–366. DOI: 10.1007/978-3-319-52234-0_19.
- [40] M. Lazic, I. Konnov, J. Widder, and R. Bloem. “Synthesis of Distributed Algorithms with Parameterized Threshold Guards”. In: *OPODIS*. Vol. 95. LIPIcs. 2017, 32:1–32:20. URL: <https://doi.org/10.4230/LIPIcs.OPODIS.2017.32>.
- [41] I. Konnov, T. Kotek, Q. Wang, H. Veith, S. Bliudze, and J. Sifakis. “Parameterized Systems in BIP: Design and Model Checking”. In: *27th International Conference on Concurrency Theory, CONCUR 2016, August 23-26, 2016, Québec City, Canada*. Vol. 59. LIPIcs. 2016, 30:1–30:16. DOI: 10.4230/LIPIcs.CONCUR.2016.30.
- [42] I. Konnov, H. Veith, and J. Widder. “SMT and POR beat Counter Abstraction: Parameterized Model Checking of Threshold-Based Distributed Algorithms”. In: *CAV (Part I)*. Vol. 9206. LNCS. 2015, pp. 85–102. DOI: 10.1007/978-3-319-21690-4_6.
- [43] I. Konnov, H. Veith, and J. Widder. “On the Completeness of Bounded Model Checking for Threshold-Based Distributed Algorithms: Reachability”. In: *CONCUR 2014*. Vol. 8704. LNCS. 2014, pp. 125–140. DOI: 10.1007/978-3-662-44584-6_10.
- [44] A. John, I. Konnov, U. Schmid, H. Veith, and J. Widder. “Brief announcement: parameterized model checking of fault-tolerant distributed algorithms by abstraction”. In: *PODC*. 2013, pp. 119–121. DOI: 10.1145/2484239.2484285.
- [45] A. John, I. Konnov, U. Schmid, H. Veith, and J. Widder. “Parameterized model checking of fault-tolerant distributed algorithms by abstraction”. In: *Formal Methods in Computer-Aided Design, FMCAD 2013, Portland, OR, USA, October 20-23, 2013*. 2013, pp. 201–209. DOI: 10.1109/FMCAD.2013.6679411.
- [46] A. John, I. Konnov, U. Schmid, H. Veith, and J. Widder. “Towards Modeling and Model Checking Fault-Tolerant Distributed Algorithms”. In: *Model Checking Software - 20th International Symposium, SPIN 2013, Stony Brook, NY, USA, July 8-9, 2013*. Vol. 7976. LNCS. 2013, pp. 209–226. DOI: 10.1007/978-3-642-39176-7_14.
- [47] I. V. Konnov. “Application of CHEAPS System to Parameterized Model Checking of Distributed Systems”. In Russian. In: *Proc. 3rd All-Russia Conf. on Methods and Techniques of Information Processing*. Moscow, 2009, pp. 116–122. ISBN: 978-5-89407-373-3.
- [48] V. A. Zakharov and I. V. Konnov. “On the Verification of Asynchronous Parameterized Distributed Programs”. In Russian. In: *Proc. 2nd All-Russia Conf. on Methods and Techniques of Information Processing*. MAKS Press, Moscow, 2005, pp. 267–372. ISBN: 5-89407-230-1.
- [49] I. V. Konnov and V. A. Zakharov. “On the Verification of Parameterized Symmetric Distributed Programs”. In Russian. In: *Proc. 1st All-Russia Conf. on Methods and Techniques of Information Processing*. MAKS Press, Moscow, 2003, pp. 395–400. ISBN: 5-89407-163-1.

Invited speaker at conferences and workshops

- [50] I. Konnov. *Quint: Quintessence of your protocols*. Talk at Gateway to Cosmos 2023 (Industry), June. 2023. URL: <https://gateway.events>.
- [51] I. Konnov. *Threshold-guarded distributed algorithms: Verification and practical challenges*. Talk at SynCoP 2023, co-located with TACAS 2023, March. 2023. URL: <https://project.inria.fr/syncop23/>.
- [52] I. Konnov. *Model Checking of Threshold-based Fault-Tolerant Distributed Algorithms*. Invited talk at the 7th Workshop on Program Semantics, Specification & Verification, St. Petersburg, Russia, June. 2016. URL: <http://pssv-conf.ru/en/2016/program>.
- [53] I. Konnov. *Parametrized Model Checking of Fault-tolerant Distributed Algorithms by Abstraction*. Tutorial at the International Conference Tools and Methods of Program Analysis, Kostroma, Russia, November. 2014. URL: <http://tmpaconf.org/pasteventsmaterialsen/keynote-speakersen#2014>.

Tutorials

- [54] I. Konnov and S. Merz. *Tutorial on the TLA+ language and its support tools*. Invited tutorial at TLA+ Community Meeting, co-located with TACAS 2023, March. 2023.
- [55] I. Konnov. *Symbolic model checking for TLA+ using Apalache*. Invited talk at TLA+ tutorial, co-located with DISC 2021, Online, October. 2021. URL: https://www.youtube.com/watch?v=M17d_3v1H88.
- [56] I. Konnov. *Thinking about protocols with TLA+ and Apalache before code is written*. Online tutorial/workshop at Hackatom Russia (online), March. 2021. URL: <https://ru.hackatom.org/>.
- [57] I. Konnov. *Model checking of distributed algorithms: from classics towards Tendermint blockchain*. Tutorial at VMCAI Winter School, New Orleans, LA, USA, January. 2020. URL: <https://popl20.sigplan.org/home/VMCAI-2020>.
- [58] I. Konnov. *What my computer can find about your distributed algorithm*. Tutorial at the Dagstuhl seminar 18211 “Formal Methods and Fault-Tolerant Distributed Computing: Forging an Alliance”, Dagstuhl, Germany, May. 2018. URL: <https://www.dagstuhl.de/en/program/calendar/semhp/?semnr=18211>.
- [59] I. Konnov. *Model Checking of Fault-tolerant Distributed Algorithms*. Tutorial at the Spring School Logic and Verification, Vienna, April. 2016. URL: <http://forsyte.at/events/love2016/>.
- [60] H. Veith and I. Konnov. *Model Checking of Fault-tolerant Distributed Algorithms*. Tutorial at the Summer School on Verification Technology, Systems & Applications, Luxembourg, Luxembourg, October. 2014. URL: <http://resources.mpi-inf.mpg.de/departments/rg1/conferences/vtsa14/>.

Peer-reviewed workshop contributions

- [61] I. Konnov and S. Merz. *Model Checking of Fault-Tolerant Distributed Algorithms: from Classics towards Contemporary*. Contribution to DSN Workshop on Byzantine Consensus and Resilient Blockchains, Luxembourg City, Luxembourg, June. 2018. URL: <https://bcrb18.fim.uni-passau.de/shortpapers/bcrb18-konnov-merz.pdf>.
- [62] I. Konnov, H. Veith, and J. Widder. *Challenges in Model Checking of Fault-tolerant Designs in TLA+*. Contribution to the 8th International Workshop on Exploiting Concurrency Efficiently and Correctly, San Francisco, CA, USA, July. 2015. URL: <http://multicore.doc.ic.ac.uk/events/ec2/KonnovVeithWidder.pdf>.
- [63] I. Konnov. “CheAPS: a Checker of Asynchronous Parameterized Systems”. In: *WING 2010*. Ed. by A. Voronkov, L. Kovacs, and N. Bjorner. Vol. 1. EPiC Series. EasyChair, 2012, pp. 128–129. URL: <http://www.easychair.org/publications/?page=355792421>.
- [64] I. V. Konnov and V. A. Zakharov. “Using Adaptive Symmetry Reduction for LTL Model Checking”. In: *Proc. International Workshop on Program Semantics, Specification and Verification (PSSV 2010) affiliated with CSR 2010*. 2010, pp. 5–11. URL: <http://csr2010.ksu.ru/PSSV.html>.
- [65] V. Zakharov and I. Konnov. “An Invariant-based Approach to the Verification of Asynchronous Parameterized Networks”. In: *International Workshop on Invariant Generation (WING’07)*. 2007, pp. 41–55. URL: http://www.risc.uni-linz.ac.at/publications/download/risc_3128/proceedings.pdf.

Conference contributions

- [66] V. V. Antonenko and I. V. Konnov. “On the Choice of a Simulation Run-Time Infrastructure based on High-Level Architecture”. In Russian. In: *17th International Conference on Computational Mechanics and Contemporary Application Software Systems 2011 (VMSPPS’2011)*, Alushta, Ukraine. 2011, pp. 36–38. ISBN: 978-5-7035-2269-1.
- [67] G. A. Klimov, D. D. Kozlov, and I. V. Konnov. “Static analysis for security of web applications developed in Python”. In Russian. In: *Proc. 5th All-Russia Scientific and Technical Conf. Microsoft technologies in theory and practice of programming*. 2008.
- [68] I. V. Konnov. “The system for verification of parameterized models of asynchronous distributed systems (CHEAPS)”. In Russian. In: *Proc. 5th All-Russia Scientific and Technical Conf. Microsoft technologies in theory and practice of programming*. 2008.

Workshop contributions

- [69] S. Feder, I. Konnov, J. Kukovec, G. Moreira, and T. Pani. *Quint: protocols as code in the logic of TLA+*. Talk at TLA+ Community Meeting, co-located with TACAS 2023, March. 2023.
- [70] J. Kukovec and I. Konnov. *Type inference for TLA+ in Apalache*. Contribution to TLA+ Community Meeting, DISC 2020, Online, October. 2020. URL: <https://youtu.be/hnp25hmCMN8>.

- [71] A. Kupriyanov and I. Konnov. *Type inference for TLA+ in Apalache*. Contribution to TLA+ Community Meeting, DISC 2020, Online, October. 2020. URL: <https://youtu.be/aveoIMphzW8>.
- [72] I. Konnov. *Making TLA+ model checking symbolic*. Talk at VeriDis + Matryoshka workshop, Amsterdam, Netherlands. June 2019. URL: <http://matryoshka.gforge.inria.fr/matryoshka2019/index.html>.
- [73] I. Konnov. *Towards symbolic model checking of fault-tolerant designs in TLA+*. Talk at the Helmut Veith Memorial Workshop, Obertauern, Austria, January. 2018. URL: <http://hvw2018.cs.uni-salzburg.at/schedule>.
- [74] I. Konnov, J. Kukovec, and T.-H. Tran. *BmcMT: Bounded Model Checking of TLA+ Specifications with SMT*. Contribution to TLA+ Community Meeting, Oxford, UK, July. 2018. URL: <http://tla2018.loria.fr/contrib/konnov.pdf>.
- [75] I. Konnov. *Verifying Safety and Liveness of Threshold-guarded Fault-Tolerant Distributed Algorithms*. Talk at the Helmut Veith Memorial Workshop, Obergurgl, Austria, February. 2017. URL: <http://cbr.uibk.ac.at/events/hvw/schedule.php>.
- [76] I. Konnov. *SMT and POR beat Counter Abstraction: Parameterized Model Checking of Threshold-based Distributed Algorithms*. Workshop contribution at Alpine Verification Meeting, Attersee, Austria, May. 2015.
- [77] A. B. Glonina, I. Konnov, V. V. Podymov, D. Y. Volkanov, V. A. Zakharov, and D. A. Zorin. *An experience on using simulation environment DYANA augmented with UPPAAL for verification of embedded systems defined by UML statecharts*. Contribution to the CAV workshop VES13, St. Petersburg, Russia, July. 2013. URL: <http://forsyte.at/wp-content/uploads/ves13-gkpvzz.pdf>.
- [78] I. Konnov. *Parameterized Model Checking by Network Invariants: the Asynchronous Case*. Contribution to: LICS Workshop AISS, Dubrovnik, Croatia, June 2012. 2012. URL: <http://forsyte.at/wp-content/uploads/12konnov-aiiss.pdf>.
- [79] I. Konnov, H. Veith, and J. Widder. *Who is afraid of Model Checking Distributed Algorithms?* Contribution to the 5th International Workshop on Exploiting Concurrency Efficiently and Correctly, Berkeley, CA, USA, July 2012. 7 citations excl. self-citations. 2012. URL: <http://forsyte.at/wp-content/uploads/2012/07/ec2-konnov.pdf>.
- [80] I. V. Konnov and O. Letichevsky. “Model Checking GARP Protocol using Spin and VRS”. In: *International Workshop on Automata, Algorithms, and Information Technologies*. 2010. DOI: 10.1007/s10559-010-9244-8.

Invited Seminar Talks

- [81] I. Konnov. *Improving usability of TLA+ tools for blockchain engineers*. Talk at Dagstuhl Seminar 23112, Unifying Formal Methods for Trustworthy Distributed Systems, March. 2023. URL: <https://www.dagstuhl.de/en/seminars/seminar-calendar/seminar-details/23112>.
- [82] I. Konnov. *Testing Cosmos applications with TLA+ and Apalache*. Talk at Dagstuhl Seminar 21431, Rigorous Methods for Smart Contracts, Online, October. 2021. URL: <https://www.dagstuhl.de/en/program/calendar/semhp/?semnr=21431>.
- [83] I. Konnov. *How TLA+ and Apalache Helped Us to Design the Tendermint Light Client*. Online talk at Interchain Conversations (online conference), December. 2020. URL: <https://www.crowdcast.io/e/interchain-conversations-II/38>.
- [84] I. Konnov. *TLA+ and Apalache to specify and check the Tendermint light client*. Online talk at LABRI seminar, Bordeaux, France, October. 2020.
- [85] I. Konnov. *Bounded Model Checking of TLA+ Specifications with SMT*. Invited talk at ANR “FREDDA” meeting, Univ. Paris-Diderot, Paris, France. 2019. URL: <https://www.irif.fr/~fredda/meetings.html>.
- [86] I. Konnov. *Making TLA+ model checking symbolic*. Talk at NETYS workshop on Verification of Distributed Systems, Marrakech, Morocco. June 2019. URL: <http://goto.ucsd.edu/~gleissen/vds-test/>.
- [87] I. Konnov. *TLA+ Model Checking Made Symbolic*. Talk at LARA seminar, EPFL, Lausanne, Switzerland, November. 2019.
- [88] I. Konnov. *Synthesizing Distributed Algorithms with Parameterized Threshold Guards*. Talk at the NETYS Workshop on Verification of Distributed Systems, Essaouira, Morocco, May. 2018. URL: <http://netys.net/VDS2018.html>.
- [89] J. Widder and I. Konnov. *Logical Methods for the Correctness of Distributed Algorithms*. RISE PI talk at “Alpine Verification Meeting”, Wagrain, Austria, September. 2018. URL: <https://avm2018.iaik.tugraz.at/program/>.
- [90] I. Konnov. *Model checking of distributed algorithms for LARGE-scale systems*. Interview talk at INRIA (awarded 1 of 4 researcher positions (CR1) at INRIA), Paris, France, May. 2017.

- [91] I. Konnov. *Verifying Safety and Liveness of Threshold-guarded Fault-Tolerant Distributed Algorithms*. Talk at LORIA/INRIA seminar, Nancy, France, May. 2017.
- [92] I. Konnov. *Model Checking of Fault-tolerant Distributed Algorithms: Safety and Liveness*. Invited talk at the Seminar of Rigorous System Design Laboratory, Lausanne, Switzerland, September. 2016.
- [93] I. Konnov. *Model Checking of Threshold-based Fault-tolerant Distributed Algorithms*. Invited talk at the Seminar on Foundations of Mathematics and Theoretical Computer Science, Ljubljana University, Ljubljana, Slovenia, May. 2016.
- [94] I. Konnov. *Model Checking of Threshold-Guarded Distributed Algorithms: Beyond Reachability*. Invited talk at the Vericub Seminar (Bertrand Meyer), Toulouse, France, November. 2016.
- [95] I. Konnov. *Model Checking of Threshold-based Fault-tolerant Distributed Algorithms*. Invited talk at Amazon, Herndon, VA, USA, June. 2015.
- [96] I. Konnov. *Model checking of threshold-based fault-tolerant distributed algorithms*. Talk at the Dagstuhl Seminar on Distributed Cloud Computing, Dagstuhl, Germany, February. 2015. URL: <https://www.dagstuhl.de/en/program/calendar/semhp/?semnr=15072>.
- [97] I. Konnov. *SMT and POR beat Counter Abstraction*. Invited talk at the RiSE Seminar at Institute of Science and Technology Austria, Klosterneuburg, Austria, April. 2015.
- [98] I. Konnov. *On Completeness of Bounded Model Checking for Threshold-based Distributed Algorithms: Reachability*. Talk at the Seminar on Theoretical Problems in Programming, Moscow State University, Moscow, Russia, February. 2014.
- [99] I. Konnov. *Counter Attack on Byzantine Generals*. Talk at the Dagstuhl Seminar on Formal Verification of Distributed Algorithms, Dagstuhl, Germany, April. 2013. URL: <https://www.dagstuhl.de/de/programm/kalender/semhp/?semnr=18211>.
- [100] I. Konnov. *Counter Attack on Byzantine Generals*. Talk at the Seminar on Theoretical Problems in Programming, Moscow State University, Moscow, Russia, February. 2013.
- [101] I. Konnov. *Who is Afraid of Model Checking Distributed Algorithms*. Talk at the PUMA/RiSE Seminar, Goldegg, Austria, September. 2012.
- [102] I. Konnov. *An invariant-based approach to the verification of asynchronous parameterized networks*. Talk at the Concurrency Seminar, Computing Laboratory, Oxford University, Oxford, UK, February. 2011.
- [103] I. Konnov. *Two Techniques of Parameterized Model Checking and Symmetry Reduction*. Talk at the RiSE Seminar, TU Vienna, Vienna, Austria, April. 2011.
- [104] I. V. Konnov. *CheAPS: Parameterized Model Checking Tool*. Joint Workshop of Microsoft Research and Institute for System Programming Russian Academy of Sciences, Moscow, June 2009. 2009.

Technical reports

- [105] N. Bertrand, V. Gramoli, I. Konnov, M. Lazic, P. Tholoniati, and J. Widder. *Holistic Verification of Blockchain Consensus*. 2022.
- [106] T. Tran, I. Konnov, and J. Widder. *A case study on parametric verification of failure detectors*. 2021.
- [107] S. Braithwaite, E. Buchman, I. Khoffi, I. Konnov, Z. Milosevic, R. Ruetschi, and J. Widder. *A Tendermint Light Client*. 2020. URL: <https://arxiv.org/abs/2010.07031>.
- [108] I. Konnov, M. Lazic, I. Stoilkovska, and J. Widder. *Survey on Parameterized Verification with Threshold Automata and the Byzantine Model Checker*. 2020. URL: <https://arxiv.org/abs/2011.14789>.
- [109] N. Bertrand, I. Konnov, M. Lazic, and J. Widder. *Verification of Randomized Distributed Algorithms under Round-Rigid Adversaries*. Nov. 2018. URL: <https://hal.inria.fr/hal-01925533>.
- [110] I. Konnov, M. Lazic, H. Veith, and J. Widder. *A Short Counterexample Property for Safety and Liveness Verification of Fault-Tolerant Distributed Algorithms*. Extended version of the POPL'17 paper including the proofs. 2016. URL: <http://arxiv.org/abs/1608.05327>.
- [111] A. John, I. Konnov, U. Schmid, H. Veith, and J. Widder. *Counter Attack on Byzantine Generals: Parameterized Model Checking of Fault-tolerant Distributed Algorithms*. Oct. 2012. URL: <http://arxiv.org/abs/1210.3846>.
- [112] A. John, I. Konnov, U. Schmid, H. Veith, and J. Widder. *Starting a Dialog between Model Checking and Fault-tolerant Distributed Algorithms*. Oct. 2012. URL: <http://arxiv.org/abs/1210.3839>.

- [113] P. Bulychev, I. V. Konnov, and V. A. Zakharov. “Computing (bi)simulation relations preserving CTL^*_X for ordinary and fair Kripke structures”. In: *Mathematical Methods and Algorithms, Institute of Systems Programming of the Russian Academy of Sciences*. Vol. 12. 2006, pp. 59–76. URL: <http://discopal.ispras.ru/pdfs/issue-2006-12/cs-isp-sbornik.pdf>.
- [114] I. Konnov and V. Zakharov. “On the verification of asynchronous parameterized networks of communicating processes by model checking”. In: *Mathematical Methods and Algorithms, Institute of Systems Programming of the Russian Academy of Sciences*. Vol. 12. 2006, pp. 37–58. URL: <http://discopal.ispras.ru/pdfs/issue-2006-12/cs-isp-sbornik.pdf>.