

# Vladimir Ulyantsev

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🔗 ulyantsev • 📞 Vladimir Ulyantsev

I am a PhD in computer science and associate professor. I have managed and participated in more than 10 R&D projects, co-authored more than 45 research papers, supervised more than 25 students (including ICPC champions).

**Research interests:** discrete optimization, machine learning, generative design, bioinformatics

**Selected skills:** research unit & project management, student' supervision

**Personal values:** independence, ambition, logic, responsibility, social well-being

**Hobbies:** swimming, skiing, surfing, singing, texas holdem

## Career overview

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Born in 1990 in St. Petersburg, Russia. I have been keen on math and programming since early childhood. Started studying computer science and programming in ITMO University in 2007, also started my career with developing and organizing programming contests. I've developed more than 100 problems, coaching teams for ICPC championships in Russia, USA, Uzbekistan.

In 2010 started a research career on developing evolutionary and Boolean satisfiability (SAT) based methods for solving NP-hard problems. Defended a PhD thesis on automata synthesis using SAT and Constraint Satisfaction Problem (CSP) solvers in 2015. In 2014 also started working in the area of bioinformatics, developing tools for metagenomic WGS analysis in collaboration with Research and Clinical Center of Physical-Chemical Medicine, Moscow.

In parallel with a research career, established as a leader and supervisor. Since 2012 participated in grant fundraising and project supervision. After defending a PhD thesis, in 2016 was appointed as the head of a joint ITMO-JetBrains Research lab (12 members). Since 2017 became the head of the Computer Technologies Lab, facilitated the expansion of the Lab from 10 members to 7 groups of a total of 130 members.

## Work

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### ITMO University, Information Technologies and Programming Faculty

*associate professor*

*Sep 2016–now*

supervising bachelor, master & PhD students, leading projects on computer science, machine learning & bioinformatics

### Large Telecom Company

*head of research group*

*Jul 2022–Aug 2023*

### ITMO University, Computer Technologies Laboratory

*lab head*

*Jul 2017–Aug 2023*

decision making, strategic planning, resource management, fundraising, collaborations establishment

### JetBrains Research

*head of optimization problems in software engineering group*

*Jul 2016–Feb 2022*

**ITMO University, Computer Technologies Laboratory***head of discrete optimization group**Sep 2013–Jul 2019***ITMO University, Computer Technologies Laboratory***researcher**Apr 2010–Dec 2015***ITMO University, Information Technologies and Programming Faculty***programming contests development & organization**Mar 2008–Mar 2010*

## Education

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**ITMO University****Saint Petersburg, Russia***PhD in Computer Science**2013–2015*

Information Technologies and Programming Faculty, Computer Technologies Department

Topic: Finite-state machine synthesis using SAT and CSP solvers

**ITMO University****Saint Petersburg, Russia***Master's degree in Applied Mathematics and Informatics**2011–2013*

Information Technologies and Programming Faculty, Computer Technologies Department

**ITMO University****Saint Petersburg, Russia***Bachelor's degree in Applied Mathematics and Informatics**2007–2011*

Information Technologies and Programming Faculty, Computer Technologies Department

## Software

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**MetaFast**<https://github.com/ctlab/metafast>*developer, algorithms designer, team leader**2014–now*

METAGENOME FAST analysis toolkit for feature extraction and calculating a number of statistics of metagenome sequences

**MetaCherchant**<https://github.com/ctlab/metacherchant>*team leader, algorithms designer**2016–now*

tool for analysing genomic environment of a nucleotide sequence within a metagenome

**RECAST**<https://github.com/ctlab/RECAST>*team leader, algorithms designer**2018–now*

pipeline for analysing metagenome time series and distinguish which reads of one metagenome sample are found in other samples

**GADMA**<https://github.com/ctlab/GADMA>*supervisor for optimization algorithms**2017–2023*

tool for automatic inference of the joint demographic history of multiple populations from the genetic data

**EFSM-tools**<https://github.com/ulyantsev/EFSM-tools>*developer, algorithms designer, team leader**2010–2019*

toolset for finite-state machine (FSM) synthesis

## Selected funded projects

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**RSCF grant**<https://rscf.ru/en/project/21-71-00051/>*principal investigator**2021–2023*

Feature extraction for de Bruijn graphs of groups of metagenomic samples and whole-genome metagenome datasets classification using machine learning

**RSCF grant**<https://rscf.ru/en/project/18-71-00150/>*principal investigator**2018–2020*

Evolution strategies for hard SAT-instances decomposition with application to cryptographic functions inversion

**RFBR A-grant** 18-07-01285  
*principal investigator* 2018–2020

Machine learning methods for synthesizing finite-state models of control systems with regard of temporal properties and timestamps based on propositional encoding

**Joint ITMO-Aalto project** 14.587.21.0032  
*senior researcher* 2018–2020

Development of methods, tools and technologies for design, verification and testing of reliable cyber-physical systems

**RFBR PhD grant** 14-07-31337  
*PhD student* 2014–2015

Automated reliable software synthesis from test examples and temporal constraints using automata-based programming

## Notable supervised students

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**2023:** Ekaterina Noskova (PhD)

**2021:** Artem Ivanov (MS)

**2020:** Ilya Zakirzyanov (PhD), Artem Pavlenko (MS), Darya Zvyagintseva (BS)

**2019:** Artem Ivanov (BS), Roman Melnikov (BS)

**2018:** Ekaterina Noskova (MS), Artem Pavleko (BS)

**2017:** Ilya Zakirzyanov (MS), Vyacheslav Moklev (BS), Ilya Kachalsky (BS)

**2016:** Artem Vasilyev (MS)

**2015:** Ilya Zakirzyanov (BS), Mikhail Melnik (BS)

## Selected bioinformatics papers

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1. Olekhnovich E, Ivanov A, Ulyantsev V, Ilina E. Separation of donor and recipient microbial diversity allows determination of taxonomic and functional features of gut microbiota Restructuring following Fecal Transplantation. **mSystems**, 2021. 10.1128/mSystems.00811-21
2. Noskova E, Ulyantsev V, Koepfli K-P, O'Brien S, Dobrynin P. GADMA: Genetic Algorithm for inferring Demographic history of Multiple populations from Allele frequency spectrum data. **GigaScience**, 2020. 10.1093/gigascience/giaa005
3. Zhernakova D et al. Genome-wide sequence analyses of ethnic populations across Russia. **Genomics**, 2020. 10.1016/j.ygeno.2019.03.007
4. Olekhnovich E, Vasilyev A, Ulyantsev V, Kostyukova E, Tyakht A. MetaCherchant: analyzing genomic context of antibiotic resistance genes in gut microbiota. **Bioinformatics**, 2018. 10.1093/bioinformatics/btx681
5. Dubinkina V, Ischenko D, Ulyantsev V, Tyakht A, Alexeev D. Assessment of k-mer spectrum applicability for metagenomic dissimilarity analysis **BMC bioinformatics**, 2016. 10.1186/s12859-015-0875-7
6. Ulyantsev V, Kazakov S, Dubinkina V, Tyakht A, Alexeev D. MetaFast: fast reference-free graph-based comparison of shotgun metagenomic data. **Bioinformatics**, 2016. 10.1093/bioinformatics/btw312

## Selected computer science papers

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1. Zvyagintseva D, Sigurdsson H, Kozin V, Iorsh I, Shelykh I, Ulyantsev V, Kyriienko O. Machine learning of phase transitions in nonlinear polariton lattices. **Communications Physics**, 2022. 10.1038/s42005-021-00755-5
2. Semenov A, Chivilikhin D, Pavlenko A, Otpuschennikov I, Ulyantsev V, Ignatiev A. Evaluating the hardness of SAT instances using evolutionary optimization algorithms. **CP 2021**. 10.4230/LIPIcs.CP.2021.47
3. Chivilikhin D, Zakirzyanov I, Ulyantsev V. BeBoSy: Behavior Examples meet Bounded Synthesis. **IEEE Access**, 2021. 10.1109/ACCESS.2021.3057823
4. Zakirzyanov I, Morgado A, Ignatiev A, Ulyantsev V, Marques-Silva J. Efficient Symmetry Breaking for SAT-Based Minimum DFA Inference. **LATA 2019**. 10.1007/978-3-030-13435-8\_12
5. Pavlenko A, Buzdalov M, Ulyantsev V. Fitness comparison by statistical testing in construction of SAT-based guess-and-determine cryptographic attacks. **GECCO 2019**. 10.1145/3321707.3321847
6. Chivilikhin D, Ulyantsev V, Shalyto A, Vyatkin V. Function block finite-state model identification using SAT and CSP solvers. **IEEE Transactions on Industrial Informatics**, 2019. 10.1109/TII.2019.2891614
7. Ulyantsev V, Buzhinsky I, Shalyto A. Exact finite-state machine identification from scenarios and temporal properties. **International Journal on Software Tools for Technology Transfer**, 2018. 10.1007/s10009-016-0442-1
8. Zakirzyanov I, Shalyto A, Ulyantsev V. Finding all minimum-size DFA consistent with given examples: SAT-based approach. **SEFM 2017**. 10.1007/978-3-319-74781-1\_9
9. Ulyantsev V, Zakirzyanov I, Shalyto A. BFS-based symmetry breaking predicates for DFA identification. **LATA 2015**. 10.1007/978-3-319-15579-1\_48

## Achievements & activities

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- Programme committee member of AAAI'2021, AINL '2016 '2017 and SNR'2017
- In 2020 together with Artem Ivanov won both tracks of PMI Metagenomics Diagnosis for Inflammatory Bowel Disease Challenge (MEDIC) (<https://www.pmiscience.com/whats-new/winners-of-sbv-improver-machine-learning-diagnostic-challenge-announced>)
- Delivered scientific and popular science lectures on various open stages, a small collection available here: <https://ulyantsev.com/talks/>
- In 2019 took part in a standup show, joking on scientific mindset
- Starting 2018 actively serving in ITMO University' councils, doing my best to evolve internal university policies
- In 2009 have been coaching ICPC team of A.F. Mozhaysky's Military-Space Academy, that was the only time their team managed to get to semifinal