

Toghrul Karimov

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Theoretical computer scientist working on decision problems that lie at the intersection of dynamical systems, number theory, logic, and automata theory

Employment

Apr 2025 - present	Postdoctoral researcher working with Valérie Berthé
	IRIF, CNRS, Paris and Max Planck Institute for Software Systems (MPI-SWS), Saarbrücken, Germany
	Funded by the ERC Synergy Grant “DnyAMiCs”
Mar 2024 - Mar 2025	Postdoctoral researcher working with Joël Ouaknine MPI-SWS, Saarbrücken, Germany

Education

Sep 2019 - Feb 2024	PhD student at Saarland University and the MPI-SWS, Germany
	Supervisor: Joël Ouaknine
	Thesis: Algorithmic verification of linear dynamical systems Received the grade <i>summa cum laude</i> , nominated for the Dissertation Prize of the German Informatics Society
Oct 2015 - May 2019	MCompSci Computer Science, University of Oxford, UK First Class Honours

Scholarships and awards

1. CPEC (see www.perspicuous-computing.science) mini-project award for a two-week research visit to Oxford University; Deutsche Forschungsgemeinschaft grant 389792660
2. Keble College Scholarship, 2016-2019. Awarded for excellent performance in exams at the end of each year
3. The Scholarship of the Ministry of Education of Azerbaijan covering the full costs of my study at the University of Oxford, 2015-2019

Teaching

Summer 2020

Graduate-level course “Automata and sequences”, teaching assistant
Saarland University

Winter 2022

Graduate-level course “Topics in algorithmic dynamical systems theory”, teaching assistant
Saarland University

Invited talks and conference presentations

1. Applications of o-minimality to linear loops. *Workshop On Loop Invariants and Algebraic Reasoning*, Aarhus, Denmark, 2025
2. From word combinatorics to automatic structures. *Workshop on Recent Developments in Arithmetic Theories and Applications*, Kolkata, India, 2025
3. On the decidability of Presburger arithmetic expanded with powers. *SODA 2025*, New Orleans, United States
4. Ode to o-minimality. *Symbolic Dynamics and Arithmetic Expansions* workshop in Roscoff, France, 2024 and *Stellenbosch University Logic Seminar*, online
5. The power of Positivity. *LICS 2023*, Boston, United States
6. The model-checking problem for linear dynamical systems. *Bellairs 2023* workshop in Barbados
7. The pseudo-reachability problem for diagonalisable affine dynamical systems. *MFCS 2022*, Vienna, Austria and *RP 2022*, Saarbrücken, Germany
8. The pseudo-Skolem problem is decidable. *MFCS 2021*, Tallinn, Estonia
9. Deciding ω -regular properties on linear recurrence sequences. *POPL 2021*, online
10. On LTL model-checking for low-dimensional discrete linear dynamical systems. *MFCS 2020*, online

Publications

1. [Multiple reachability in linear dynamical systems](#)
T. Karimov, E. Kelmendi, J. Ouaknine, J. Worrell
LICS 2025
2. [Verification of linear dynamical systems via o-minimality of the real numbers](#)
T. Karimov
ICALP 2025

3. [On the decidability of Presburger arithmetic expanded with powers](#)
T. Karimov, F. Luca, J. Nieuwveld, J. Ouaknine, and J. Worrell
SODA 2025
4. [The monadic theory of toric words](#)
V. Berthé, T. Karimov, J. Nieuwveld, J. Ouaknine, M. Vahanwala, and J. Worrell
Theoretical Computer Science, Vol. 1025
5. [On the decidability of monadic second-order logic with arithmetic predicates](#)
V. Berthé, T. Karimov, J. Nieuwveld, J. Ouaknine, M. Vahanwala, and J. Worrell
LICS 2024, Distinguished Paper Award
6. [Linear dynamical systems with continuous weight functions](#)
R. Aghamov, C. Baier, T. Karimov, J. Piribauer, and J. Ouaknine
HSCC 2024, ACM SIGBED Best Paper Award
7. [Model checking Markov chains as distribution transformers](#)
R. Aghamov, C. Baier, T. Karimov, J. Nieuwveld, J. Ouaknine and M. Vahanwala
Principles of Verification: Cycling the Probabilistic Landscape, LNCS 15261, 2024
8. [The power of Positivity](#)
T. Karimov, E. Kelmendi, J. Nieuwveld, J. Ouaknine and J. Worrell
LICS 2023
9. [What’s decidable about discrete linear dynamical systems?](#)
T. Karimov, E. Kelmendi, J. Ouaknine and J. Worrell
Principles of System Design—Thomas A. Henzinger Festschrift, LNCS 13660, 2022
10. [Parameter synthesis for parametric probabilistic dynamical systems and prefix-independent specifications](#)
C. Baier, F. Funke, S. Jantsch, T. Karimov, E. Lefauchaux, J. Ouaknine, D. Purser, M. Whiteland, and J. Worrell
CONCUR 2022
11. [The pseudo-reachability problem for diagonalisable linear dynamical systems](#)
J. D’Costa, T. Karimov, R. Majumdar, J. Ouaknine, M. Salamati, and J. Worrell
MFCS 2022

12. [What’s decidable about linear loops?](#)
T. Karimov, E. Lefauchaux, J. Ouaknine, D. Purser, J. Worrell, and M. Whiteland
POPL 2022, Proc. of the ACM on Programming Languages, Vol. 6
13. [The orbit problem for parametric linear dynamical systems](#)
C. Baier, F. Funke, S. Jantsch, T. Karimov, E. Lefauchaux, F. Luca, J. Ouaknine, D. Purser, M. Whiteland, and J. Worrell
CONCUR 2021
14. [The pseudo-Skolem problem is decidable](#)
J. D’Costa, T. Karimov, R. Majumdar, J. Ouaknine, M. Salamati, S. Soudjani, and J. Worrell
MFCS 2021
15. [Deciding \$\omega\$ -regular properties on linear recurrence sequences](#)
S. Almagor, T. Karimov, E. Kelmendi, J. Ouaknine, and J. Worrell
POPL 2021, Proc. of the ACM on Programming Languages, Vol. 5
16. [Reachability in dynamical systems with rounding](#)
C. Baier, F. Funke, S. Jantsch, T. Karimov, E. Lefauchaux, J. Ouaknine, A. Pouly, D. Purser, and M. Whiteland
FSTTCS 2020
17. [On LTL model-checking for low-dimensional discrete linear dynamical systems](#)
T. Karimov, J. Ouaknine, and J. Worrell
MFCS 2020